

# **City of Milpitas Building and Safety Department**

# FOR SINGLE FAMILY RESIDENTIAL PROJECTS



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# CONSTRUCTION GUIDELINES FOR SINGLE FAMILY RESIDENTIAL PROJECTS

These construction guidelines are for single family residential projects within the City of Milpitas. This handbook is not exhaustive in scope, nor is it intended as an installation guide for untrained construction workers. It is merely a guideline for some common items found during the inspection of typical one and two family residential construction. The standards, codes, ordinances, interpretations and practices described in this handbook may be changed, updated, or corrected at any time without correcting or republishing this handbook. Refer to the adopted Codes for full requirements.

### **Code Adoption: January 1st, 2011**

2010 California Residential Code (CRC)

Based on the 2009 International Residential Code

2010 California Electrical Code (CEC)

Based on the 2008 National Electrical Code

2010 California Plumbing Code (CPC)

Based on the 2009 Uniform Plumbing Code

**2010** California Mechanical Code (CMC)

Based on the 2009 Uniform Mechanical Code

2010 California Green Building Standards Code (CalGreen)

2010 California Energy Code

**2011** Milpitas Municipal Code (MMC)

### **Code sections as shown:**

"CRC sec. 301" is referring to 2010 California Residential Code

"CMC sec. 1005.2" is referring to 2010 California Mechanical Code

"CEC sec. 511.3" is referring to 2010 California Electrical Code

"CPC sec. 610.2" is referring to 2010 California Plumbing Code

"MMC II-3-2.04" is referring to 2011 Milpitas Municipal Code

# **Table of Contents**

1. DEFI	NITIONS	5
2. FOUN	NDATION INSPECTION	6
3. UND	ERFLOOR INSPECTION	12
4. SUB-	FLOOR STRUCTURE/NAIL	19
	F STRUCTURE/NAIL	
	VENTIONAL FRAME WALL BRACING	
	AR INSPECTIONS	
	ME INSPECTION	
	D BURNING APPLIANCES	
	ONRY FIREPLACE	
	FING	
	LATION & ENERGY CONSERVATION INSPECTIONS	
	OND SIDE/INTERIOR SHEAR	
	ED WALLS	
	L INSPECTION	
	MING POOLS	
	OLITION PERMITS	
18. REFE	RENCES	63
Fig. 2-1:	Footing Setback from Descending Slope Surface	
Fig. 2-2:	Building Clearance from Ascending Slope	
Fig. 2-3:	Minimum Footing with Raised Floor	
Fig. 2-4:	Minimum Footing with Slab on Grade	
Fig. 2-5:	Pier and Grade Beam Details	
Fig. 3-1:	Sill Anchor Bolts Requirements	
Fig. 3-2:	Stepped Footing	
Fig. 3-3:	Opening in Horizontal Diaphragm	
Fig. 3-4:	Joist Lap	
Fig. 3-5:	Framing Around Opening	
Fig. 4-1:	Notches and Holes in Joists/Girders (Sawn Lumber)	
Fig. 4-2:	Notches and Holes in Studs	
Fig. 6-1:	Braced Wall Requirements	
Fig. 8-1:	Emergency Escape Window	
Fig. 8-2:	Window Well for Emergency Escape Window in Basement	
Fig. 8-3:	Stair and Handrail Requirements	
Fig. 8-4:	Winder Tread	
Fig. 8-5:	Guard and Handrail Requirements for Stairs in R-3	
Fig. 8-6:	Ramp Edge Protection	
Fig. 8-7:	Garage and Dwelling Unit Separation	
Fig. 8-8:	Attic Ventilation	
Fig. 8-9:	Safety Glazing Adjacent to Door	
_	Safety Glazing Adjacent to Stair	
	Safety Glazing Adjacent to Bottom Tread	
	Safety Glazing within 36" of Walking Surface	
гід. 10-13	Swimming Pool	. 02

### City of Milpitas Building and Safety Department

Table 2-1:	Cast-in-Place Minimum Cover Requirements	. 10
	Floor Joist Span Table	
	Rafter Span Table	
	Ceiling Joist Span Table	
	Rafter Tie Connection.	

### 1. DEFINITIONS

### □ Braced wall line:

- each **braced wall line** consists of **braced wall panels** in line or offset from each other by not more than 4'
- each structure divided into transverse (side-to-side) and longitudinal **braced wall lines** along perimeters and at intervals **not** exceeding 25'

### □ Braced wall panel:

- provides lateral resistance to wind and seismic forces from roof diaphragm to foundation in conventionally framed buildings
- typically extends from roofline to foundation
- **typically 4' x 8' section of wall**: studs at 16"oc, 3%" ply or OSB, edge nailed at 6"oc, field nailed at 12 oc, sill nailed at 6 oc, frieze blocks/rims nailed at 6"oc or clipped at 24"oc
- 4' minimum width, 10' maximum height, **except** at alternate braced wall panels and approved listed manufactured wall panels
- percentage of bracing required varies by **seismic design category**, type of bracing, and number of floors supported
- all braced wall panels shall be detailed on plans
- □ Fire barrier at exterior walls with less than 5' fire separation distance for non-sprinklered buildings (CRC Table R302.1(1)) and 3' fire separation distance for sprinklered buildings (CRC Table R302.1(2)):
  - 1 hr rated wall; openings limited by % of wall area, **not** rating of opening

### □ Fire partition at dwelling unit separations (duplexes) (CRC sec. R302.3):

- 1 hr rated wall, fire protection at back-to-back electrical boxes, dissimilar materials (plastic to metal) not allowed at membrane penetrations, dampers may be required
- continuous from foundation to underside of roof sheathing unless
  - attic draft stopped, ceiling protected by 5/8" Type X drywall, **and** all structural framing supporting ceiling protected by 1/2" drywall
- **sprinklered building** : ½ hr wall;

### □ R3 and R3.1 occupancy:

- considered category II for seismic design
- R3 occupancy includes **1 & 2 family dwellings** (single family and duplex); **day care** for less than 24 hrs; **congregate living** for up to 16 persons; **and townhouses** with separate entrances, up to (3) stories
- R3.1 occupancy includes **24 hr day care** for less than 6 clients
- accessibility provisions (CBC sec. 1101B.6) apply to commercial uses in private residences, including entry, exterior & interior path of travel, & sanitary facilities

### □ Seismic design categories & SDS:

- seismic design categories of structures based on the design spectral response acceleration coefficient, S<sub>DS</sub>:
- **seismic hazard zone** determined by address and default S<sub>DS</sub> value
- lower hazard  $(S_{DS} < 1)$  high & mid hazard  $(S_{DS} \ge 1)$

5 of 63

### 2. FOUNDATION INSPECTION

### **Setbacks**

- Property lines are clearly marked
- Verify setbacks conform to zoning
- Utility easements, overhead clearances, clearances between detached buildings
- □ Verify setbacks from slopes (CRC Fig. R403.1.7.1): (See Fig. 2-1 & 2-2)
  - top of slope to face of footing: \( \frac{1}{3} \) x vertical rise of slope up to 40'
  - toe of slope to face of structure: ½ x vertical rise of slope up to 15'
  - **vertical rise of slope** measured from top of retaining wall

### **Grading & Pad Creation**

- □ Collect compaction report for imaging (if building pad created)
- □ **Additions:** Check whether the new footing type matches the existing. (MMC II-3.5-2.04 & II-3.5-2.13)

### Footings (City Policy BDP-BLG06)

- □ Footing depth & dimensions conform to plan (See Fig. 2-3 & 2-4)
  - The minimum depth of exterior footings shall be 18 inches below the undisturbed ground surface and minimum depth of interior footings shall be 12 inches below ground surface, **unless** soils report is provided. When soil report is shown on the drawing, check the observation and acceptance letter from the soil engineer for the foundation excavation.
- □ Verify steel grade, size, laps, ties & clearances
  - **grade**: # 40 minimum
  - horizontal rebar: (2) #4's minimum, (1) top & bottom continuous (CRC Sec. R403.1.3)
  - additional #4 at 18"oc vertically **if** stem wall height greater than 24"
  - **vertical rebar**: #4 at 24"oc **if** stem wall height **above** footing greater than 36" **or** construction joints exist
  - laps: 40 bar diameters unless engineered (20" minimum at #4 bar)
  - clearances: 3" minimum from bottom of footing (CRC sec. R403.1.3)
- □ Grade and elevation:
  - foundation elevation: 12" + 2% above street gutter minimum (CRC sec. R403.1.7.3)
  - 5% grade toward street or drainage easement for 10' minimum (6" rise) **or** provide approved detail (swales sloped 2% toward yards) (**CRC sec. R401.3**)
  - mudsill on concrete or masonry in contact with earth shall be preservative-treated **or** naturally durable wood (**CRC sec. R317.1**)
  - 6" minimum between finish grade and siding/sheathing/wall framing unless preservativetreated wood (CRC sec. R317.1)
- □ Trenches clean and free of debris
- Buildings more than 50'wide: continuous foundation required beneath all interior braced wall lines, (typically all shear walls require continuous foundations regardless of building size)

- □ **Verify HD placement**: diameter of anchor bolts and their spacing, embedment depth, & edge distances conform to plan & manufacturer's recommendations
- □ 6" minimum stem wall thickness for single story building except
  - manufactured shear walls may require 8" minimum stem wall thickness(provide manufacturers' installation instructions)
- □ Templates required at manufactured shear walls
- □ Verify plumbing and electrical raceways & pipe clearances to HD bolts, rebar, & adjacent footings
  - plumbing trenches **deeper than and parallel to** foundations shall be located outside the angle of repose (45°angle) (CPC sec.313.3 & 315.1)
  - sleeves are required at plumbing thru concrete or masonry (CPC 313.10.1)
- □ Step footing is required at greater than 1:10 slope
  - minimum step is 1: 2, rise to run
- □ Retaining walls require design & inspection whenever
  - greater than 4 ft in height, measured from the bottom of the footing to the top of the wall, or
  - regardless of height, whenever retaining walls support a surcharge

### Concrete Foundation Pier and Grade Beam (per MMC sec. II—3-2.13) (See Fig. 2-5)

- □ 12" in diameter, 6 feet deep and have a horizontal spacing of no greater than 6 feet.
- □ Projection of piers in crawl space: 8" minimum above pad grade unless preservative-treated posts
- □ 10"wide x 16"deep grade beam with 1½"void space below grade beam

### Pier and Grade Beam (per Engineer's design on plan)

- Spacer form beneath grade beams, if required
- Review special inspection and structural observation reports

### **Grounding Electrode**

- □ Ufer type grounding electrode shall be utilized whenever possible (CEC article 250.50 and MMC sec.II-6-2.04):
  - all new construction: electrode shall be encased by at least 2"of concrete located within and near the bottom of the foundation that is in direct contact with the earth
  - all additions & remodels involving both a service change and foundation work
  - 20' #4 rebar lapped & made accessible and
  - connection side of the electrode shall be located remotely away from the main electrical service equipment

### **Slab Inspection**

- □ Slab thickness (MMC sec. II—3-2.13): 4" minimum
- □ Check plan and soils report for required
  - drain rock as specified or 4" thick minimum
  - vapor barrier: 6 mil minimum and 6" lap minimum with 2" sand cushion on top
- □ Reinforcement installed per plan
- □ Perimeter dowels installed if applicable

- □ Plumbing trenches **deeper than and parallel to** foundations shall be located outside the angle of repose (45° angle) (CPC sec.313.3 & 315.1)
- □ Sleeves are required at plumbing thru concrete or masonry (CPC 313.10.1)
- Special inspection report verified

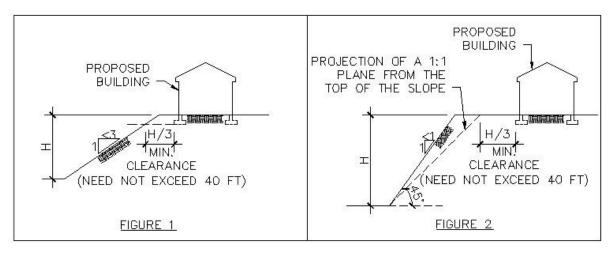
### Block Wall (R606, ACI 530)

□ If supporting a structure, block wall shall be engineered; not empirical design and special inspection is required. (ACI 530-5.1.2.2)

### Verify Flood Zone requirements, if any

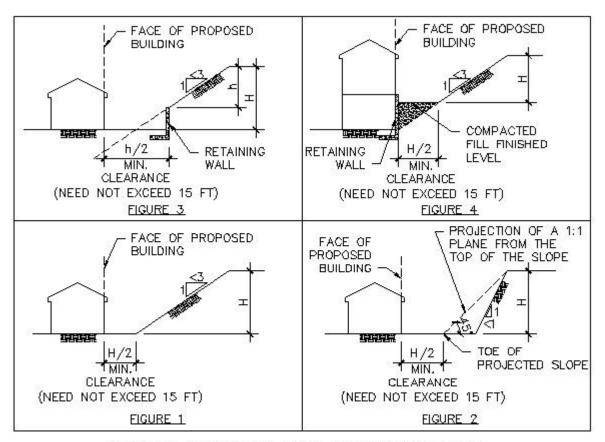
### **Preview of upcoming inspections**

- □ Clarify details, deferred submittals, truss calculations, reports, revisions, to be approved/ available for pending inspections
- □ Verify storm water protection & site conditions
- □ Clarify radiant barrier & window requirements; fire protection; energy; egress; & tempered glass
- Clarify that fasteners into preservative treated and fire-retardant treated wood shall be hot dip, zinc coated galvanized, stainless steel, or equal
- □ Clarify stud, sill, bolt sizing, spacing for shear values greater than 350plf (4:12, 3:12, & 2:12 nailing), & bearing walls greater than 10'



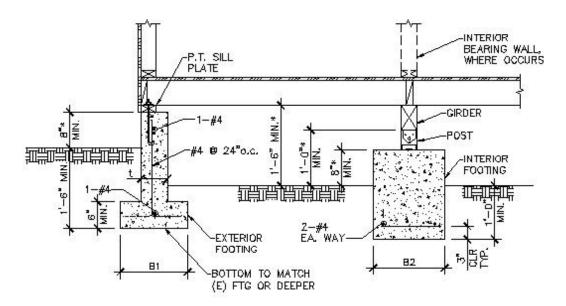
FOOTING SETBACK FROM DESCENDING SLOPE SURFACE

Fig. 2-1



BUILDING CLEARANCE FROM ASCENDING SLOPES

**Fig. 2-2** 



WOOD MEMBERS SHALL BE NATURALLY DURABLE OR PRESERVATIVE-TREATED IF MIN. DISTANCE IS NOT MAINTAINED

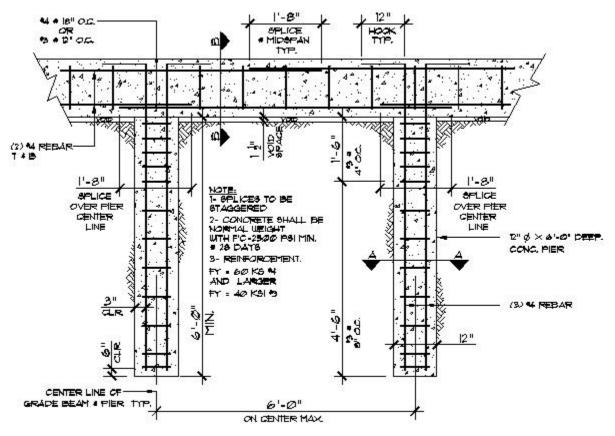
NO. OF STORIES SUPPORTED BY FTG.	STEM WALL THK. (t)	EXTERIOR FTG. WIDTH (B1)	INTERIOR FTG. WDTH (B2)	INTERIOR FTG, MAX. SPACING
1 FLOOR ONLY	6"	12"	16" SQ.	6'-0"
1 FLOOR + 1 ROOF	6"	12"	24" SQ.	6'-0"
2 FLOORS + 1 ROOF	8"	15"	30" SQ.	6'-0"

NOTE: THIS TABLE IS BASED ON MAX. 8 FT FLOOR JOIST SPAN AND MAX. 20 FT ROOF RAFTER SPAN.

2" THK. SAND INTERIOR BEARING WALL 4" THK. COARSE ROCK #4 @ 18 o.c. EA. WAY OR 6X6X10 WWM AT P.T. SILL OR PEA GRAVEL PLATE, TYP. VAPOR BARRIER SLAB MID DEPTH MEMBRANE 1 Z. 9 4 DOWELS **0** 18"o.c. (DOWELS NOT REQUIRED IF SLAB AND FTG. ARE POURED MONOLITHICALLY) ВОТТОМ ТО МАТСН (E) FTG OR DEEPER 12" MIN. (1-STORY) 15" MIN. (2-STORY)

Fig. 2-3 – Minimum Footing with Raised Floor

Fig. 2-4 – Minimum Footing with Slab on Grade



# DETAIL OF PIER ≰ GRADE BEAM FOUNDATION PER MMC SECTION II-3-2.18

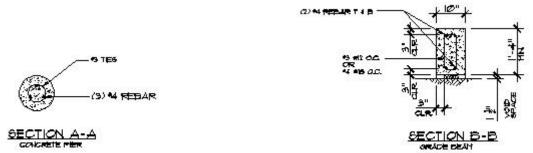


Fig. 2-5 – Pier and Grade Beam Details

### 3. UNDERFLOOR INSPECTION

**■** Verify that foundation has been approved

### **Mudsill Material**

□ Naturally durable **or** preservative-treated wood in direct contact with concrete & earth and less then 8" below the exposed earth. Fasteners for preservative treated wood shall be of hot dipped zinc-coated galvanized steel. (**CRC sec. R317.1 & R317.3.1**)

### Mudsill Bolting (CRC sec. R403.1.6, R602.11.1) (See Fig. 3-1)

- □ Buildings up to 2 stories:
  - 6'o.c. max. at braced wall and 4'o.c. max. for buildings over two stories
  - 1/2" diameter bolt minimum
  - 7" embedment, minimum
  - (2) bolts each per piece minimum
  - 4" minimum & 12" maximum from splices and ends
  - 1 ¾" from edge, minimum
  - hole size: 1/16" greater than bolt size, maximum
  - 3" x 3" x  $\frac{1}{4}$ " (0.229"min.) plate washers at each bolt
  - 1¾" diagonally-slotted washers require an additional standard washer

### Cripple Walls (Sec.2308.2, 2308.9.4, 2308.12.4 & Table 2308.12.4)

- □ Cripple walls greater than 14": braced as for the first story supporting additional floor & roof
- □ Cripple walls less than 14": solid rim required, clipped & nailed as for the floor bracing above
- All braced wall panels extend from roof sheathing to continuous foundation, except for buildings not more than 50'wide:
  - One-story: continuous foundation not required beneath interior braced walls (sec.2308.3.4 Exception and MMC sec.II-3-2.34)
  - **Two-story building:** may have continuous foundation **not** required beneath interior braced walls provided (MMC sec.II-3-2.34):
    - 1. Cripple walls do not exceed 4 feet in height
    - 2. Where the first story is supported on a raised wood framed floor, the interior braced wall panels are directly supported by either double joists, continuous 4X blocking or minimum 4X floor beams

### Stepped Footing Detail (CBC Fig. 2308.11.3.2) (See Fig. 3-2)

□ Stepped footing at cripple wall use detail **2308.11.3.2**: strap plate offset use 16ga x 4'-0" metal strap, 2'-0" minimum each side of splice with 8-16d common nails.

### **Underfloor Shear Connections**

☐ Identify shear walls and braced wall lines; check load path continuity to foundation

- □ Shear wall sill bolting as per plan shear wall table
- □ Shear transfer connections installed as per plan shear wall table
- □ HD's extended to engage posts for full load capacity: 1" per 12" maximum offset (based on manufacturer's specification)
- □ Compression posts full depth of rim adjacent HD's (squash blocks same size as the post between the mud sill and raised floor when HD is installed on the raised floor)
- □ Hardy panels 24" and narrower at raised floors: require bearing plates. Refer to current valid ICC ESR report.
- □ Retrofit HD and anchor bolts require special inspection letter, **except** retrofit HD bolts at alternate braced wall panels may be installed **in the presence of & inspected by** city inspectors, if number of bolts does not exceed 8

# Floor Joists: (Span Table 2308.8(1)"sleeping areas" or Table 2308.8(2) "any residential area other than sleeping areas") (See Table 3-1)

- □ Joists doubled under all braced walls & bearing walls (2308.8.4), or blocked at 16"oc
- □ Openings greater than 4': blocked & strapped per CBC Fig. 2308.11.3.3 (See Fig. 3-3)
- $\Box$  Joist bearing (sec.2308.8):
  - on wood: 1½" minimum
  - on masonry: 3" minimum
- $\supset$  Joist laps: (See Fig. 3-4)
  - 3" laps minimum with 3-16d's, **or** 1½" bearing minimum & splices strapped with ST18 or equal (6-16d nails **each side** minimum)
- □ Joist blocking required at (2308.8.5):
  - ends **and** all bearing points
  - 2 x 14 and larger joists: 8' oc
- □ Joist nailing (Table 2304.9.1):
  - to sill or girder: 3-8d or 2-16d
  - rim joist or blocking: 8d's at 6" oc
  - rim joist to floor joist: face nail with 3-16d's
- □ Manufactured floor joists and trusses (2308.2.1): per plan and manufacturer's details
  - web stiffeners as required
  - TJI 1¾" bearing; 2-10d (1 each flange); maximum 6" oc each side, staggered
  - TJI flanges shall not be notched or cut; 2 x diameter minimum between holes; hole sizes limited at ends of joists
  - LVL (Microllam), PSL (Parallam), LSL (TimberStrand) Beams: 2x diameter minimum between holes; holes not allowed at ends of joists
  - Cuts, notches and holes bored in trusses, structural composite lumber, structural glue-laminated members or I-joists are not permitted except where permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a registered design profession.

### **Girders**

- □ Girder bearing (sec.2308.7):
  - 3" minimum at footing
  - 4 x minimum post support at splices and ends
  - girder-to-girder splices: gusseted or strapped with ST 12 or equal
  - ½" air spaces at sides, ends & top at mudsill bearing in girder masonry pockets
  - girder-to-post: positive connection required (gusseted or clipped)
- □ Bearing partitions supported by doubled joists or girders (2308.8.4)
- □ **Girders supporting loads from a single floor**: 4 x 6 minimum, at 6' span maximum and 8' oc maximum

### Clearances and Protection of Wood (sec.2304.11.2) (See Fig. 2-3)

- □ 12" minimum between girders & ground (18" if girders only, without joists)
  - 18" minimum to joists, subfloor, & insulation
  - protect entire floor assembly at reduced clearances: preservative treated posts, girders, joists, and subfloor plywood
- □ Piers elevated at:
  - under-floor: 8" minimum above earth or preservative-treated posts are required
  - **basements and outside**: 6" minimum **above** earth, **or** 1"**above** slab **or** preservative-treated posts are required
- □ Sheathing, **other than** finished siding: 8" minimum above earth **or** preservative-treated
- □ Concrete steps poured against wood require 26ga galvanized flashing to protect wood, installed tight against wall & caulked with mastic (aluminum is **not** allowed)
- □ Fasteners for preservative treated and fire-retardant treated wood: hot dip, zinc coated galvanized (1.85 oz/sq ft minimum per ASTM A653 & A153), stainless steel, or equal (sec.2304.9.5)

### Access Provided (sec.1209.1)

- □ 18" x 24" minimum opening **and** passageway to crawl space
- "Pipes, ducts and other construction shall **not** interfere with the accessibility to or within under-floor areas"

# <u>Diaphragm Openings in Conventionally Framed Construction (sec.2308.8.3, 2308.11.3.3 & 2308.12.6 (6)):</u> (See Fig. 3-5)

- □ Not more than 50% of the width between braced walls, unless engineered
- □ Not more than 25% of the area bordered by braced walls, unless engineered
- □ Not more than 4'opening unless blocked & strapped per CBC Fig. 2308.11.3.3
- □ Openings greater than 4': require double headers & trimmers (sec.2308.8.3)

- □ **Openings greater than 6**': require hangers or clips at headers and trimmers unless bearing on a beam, partition or wall
- □ Tail-joists greater than 12': require hangers, clips or ledgers

### **Underfloor Ventilation (sec.1203.3)**

- □ Provide cross ventilation with net clear area of 1 sq ft per 150 sq ft of total floor area
  - at additions, maintain & extend existing vents **and** add required ventilation for new floor area and protect vent openings with corrosion resistant wire mesh screen or equal with max. 1/8" least screened opening dimension.

### **Preview of upcoming inspections**

- □ Separate underfloor insulation inspection **usually not** required **apart from** the insulation & energy conservation inspections prior to final
- □ Separate sub-floor inspection for one-story addition **usually not** required, **unless** diaphragm details require special zone & collector nailing
- □ Sub-floor inspection required prior to raising second floor walls
  - sub-floor inspection includes ceiling-floor framing: joists, beams, blocking, zone & collector nailing, transfer clips & straps
- □ Sheathing at interior braced walls & shear walls **not** installed until after frame & insulation inspections **unless** wall remains open on one side
- Roof structure/nail inspection includes rafter, truss, and ceiling framing; no "ply only" inspection.
  - Check roof truss shop drawings for required strap/tie to resisting uplift in some trusses.
  - deferred submittals, truss calculations, retrofit, special inspection, & structural observation reports, revisions, to be approved and available for roof structure/nail & bracing/shear inspection

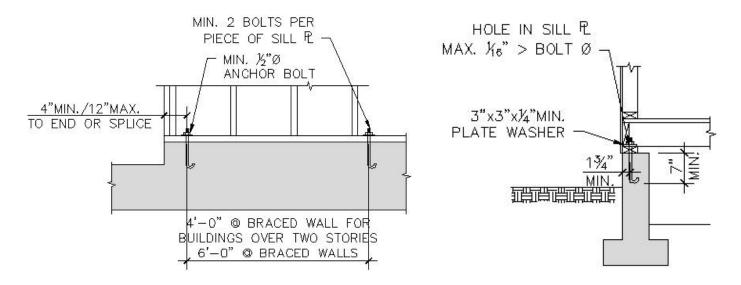
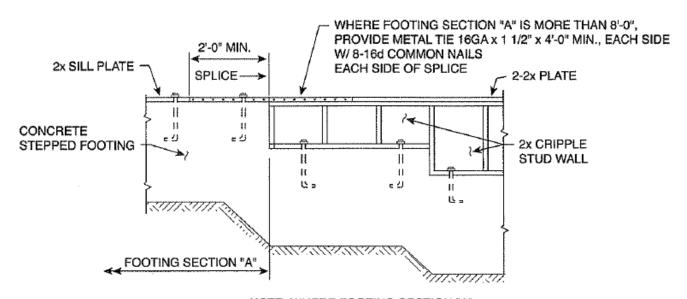


Fig. 3-1: Sill Anchor Bolts Requirements



NOTE: WHERE FOOTING SECTION "A" IS LESS THAN 8'-0" LONG IN A 25'-0" TOTAL LENGTH WALL, PROVIDE BRACING AT CRIPPLE STUD WALL

Fig. 3-2: Stepped Footing

TABLE D — FLOOR JOISTS (FJ) SPAN TABLE								
FLOOR JOISTS	SPECIES AND	MAXIMUM FLOOR JOIST SPANS						
SPACING	GRADE	2x6	2x8	2x10	2x12			
	D.F. S.S.	10'-4"	13'-7"	17'-4"	21'-0"			
16"	D.F. #1	9'-8"	12'-4"	15'-0"	17'-5"			
10	D.F. #2	9'-1"	11'-6"	14'-1"	16'-3"			
	D.F. #3	6'-10"	8'-8"	10'-7"	12'-4"			
	D.F. S.S.	9'-0"	11'-11"	14'-9"	17'-1"			
24"	D.F. #1	7'-11"	10'-0"	12'-3"	14'-3"			
Z+	D.F. #2	7'-5"	9'-5"	11'-6"	13'-4"			
	D.F. #3	5'-7"	7'-1"	8'-8"	10'-1"			

**Table 3-1: Floor Joists Span Table** 

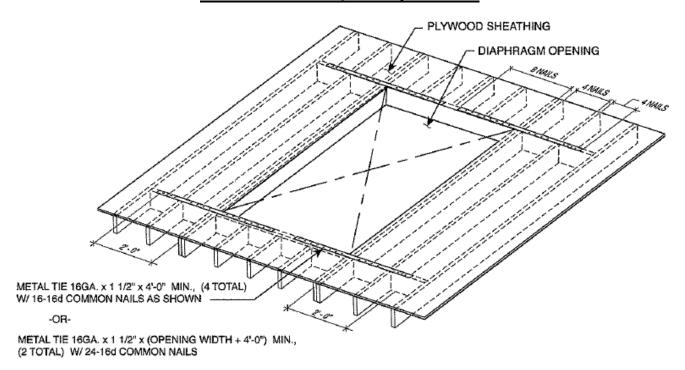


Fig. 3-3: Opening in Horizontal Diaphragm

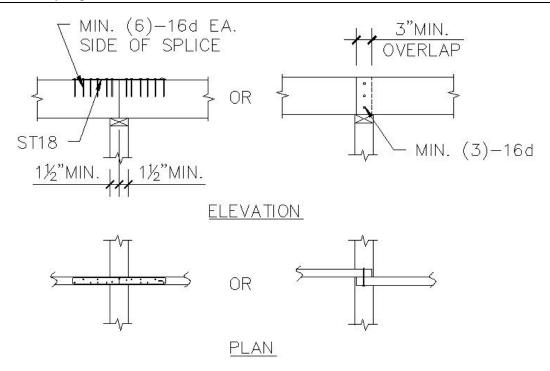


Fig. 3-4: Joist Lap

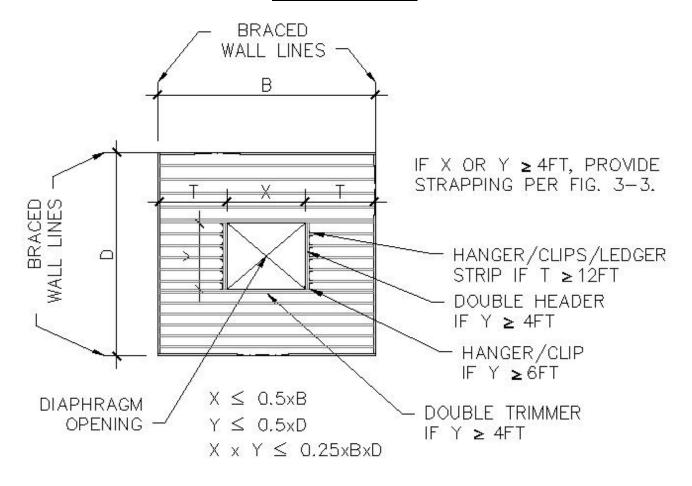


Fig. 3-5: Framing Around Opening

### 4. SUB-FLOOR STRUCTURE/NAIL

- Verify previous inspections approved
- □ Verify floor-ceiling framing conforms with plan & code floor joist spans: (**Table 2308.8(1) for** sleeping areas & attics with fixed stairs **or Table 2308.8(2) for** any residential area)
  - beam & joist sizing, bearing, & orientation
  - Diaphragm Openings in Conventionally Framed Construction (Sec.2308.8.3, 2308.11.3.3 & 2308.12.6 6) (See Sec. 3: Underfloor Inspection)
  - Notching & boring rafter & joist (CBC sec.2308.8.2 & 2308.8.2.1, 2308.10.4.2, NDS sec. 4.4.3) (See Fig. 4-1)
  - Cutting and notching of bearing stud (sec. 2308.9.10). Not to exceed 25% of the stud width for bearing wall, and not to exceed 40% for non-bearing partition. (See Fig. 4-2)
  - Bored holes in bearing stud (sec. 2308.9.11). Hole diameter not to exceed 40% of the stud width for bearing wall, and 60% for non-bearing partition. In no case shall the edge of the bored hole be greater than 5/8" to the edge of the stud. (See Fig. 4-2)
  - beams to posts require positive connection
  - bearing partitions supported by doubled joists, beams, or other bearing walls/partitions (sec. 2308.8.4)
- □ Floor-ceiling shear connections completed:
  - blocked diaphragms, perimeter blocking, parallel condition blocking, and ply-less-than-24" blocking
  - collector blocking, drag straps, transfer clips, and floor-to-shear edge and boundary nailing
  - plates strapped at splices less than 4' (Go to braced wall lines section)
  - bearing plates & squash blocks as required by manufacturer for stacked shear wall systems (Refer also to manufacturer's installation instruction and ESR report)

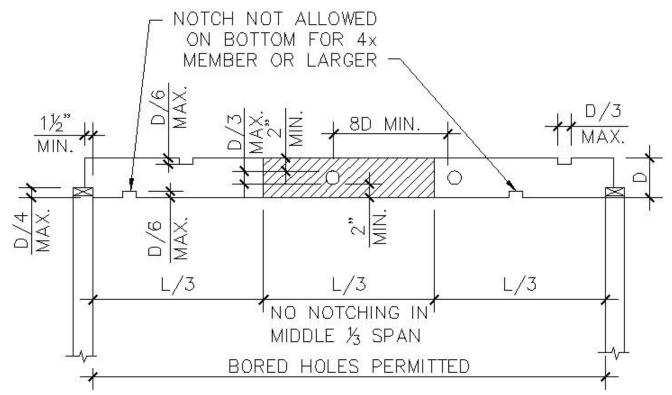
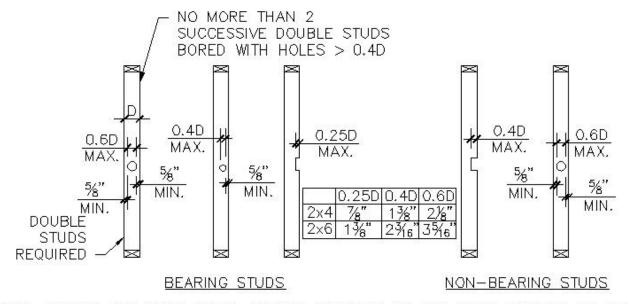


Fig. 4-1: Notches and Holes in Joists/Girders (Sawn Lumber)



NOTE: NOTCH AND HOLE SHALL NOT BE LOCATED AT THE SAME SECTION OF STUD

Fig. 4-2: Notches and Holes in Studs

### 5. ROOF STRUCTURE/NAIL

- Verify previous inspections approved
- Roof structure/nail inspection includes rafter, truss, and ceiling framing
- Verify radiant barrier requirement as applicable
- Eave proximity to property line:
  - 1 hr fire protection at less than 5'
  - **no** openings at 3' or less
  - eave overhang is **not allowed** less than 2'to property line
- Verify fire protection extends through crickets above ceilings & low roofs
- Verify ventilation
- Verify rafter & ridge design compatible with insulation & ventilation provisions
- Verify existing shear maintained: existing second-story wall to new first story roof (one-story addition to two-story structure)
- Verify attic access provided (sec.1209.2) wherever
  - 30"minimum headroom above access opening
  - 20" x 30" minimum opening and passageway to and thru access, and
  - increased for attic furnace access (CMC sec.904.11.1):
    - 1. opening and passageway 22"x 30" minimum, and
    - 2. sufficient for the largest component of the furnace
- Verify clearances between openable skylights and vents:
  - exhaust ducts: 3' minimum
  - gas appliance vents: 4' minimum
  - DWV: 10' minimum away from or 3' minimum above

### **Conventional roof framing requires inspection**

- 3:12 slope minimum
- typically ½" nominal solid sheathing nailed at 6"oc at edges & 12"oc in a field w/8d nails
- 5/16" ply minimum per **Table 2304.7 (3) and** 2 x planking per **Table 2308.10.9** also allowed
- nail heads shall **not** penetrate face ply
- edge nail through roof ply into all braced walls & shear walls at 6"oc
- frieze blocks and panel blocks installed, and clipped or edge nailed to plates
- verify ceiling joist size & spacing (See Table 5-2)
- verify rafter size & spacing (See Table 5-1)
- verify rafters/ ceiling joists/ beams notches & taper cuts (See Fig. 4-1)
- wind uplift connectors required & shall be continuous from rafter to foundation (Table 2308.10.1): exterior walls, minimum H 2.5 connector for rafter to plate
- rafter tie (collar tie) nailing, varies by roof slope & span (Table 2308.10.4.1) (See Table 5-3)
- ceiling joist splices use same nailing schedule as rafter ties (**Table 2308.10.4.1**)
- where joists are **parallel** to rafters, ceiling joists shall be nailed to rafters

21 of 63 Roof Structure/Nail January 2011

Construction Guidelines for Single Family Residential Projects

- where joists are **not** parallel to rafter, an equivalent rafter tie shall be installed in a manner to provide a continuous tie across the building at a spacing not more than 4'. (2308.10.4.1) or provide purlin/beam support per approved plan details
- purlin size equivalent to rafter size (sec.2308.10.5). Max. span of 2x4 purlin is 4'. Max. span of 2x6 is 6'.
- purlin struts: supported by bearing walls, 45° from horizontal minimum and laterally braced if longer than 8'
- roof sheathing narrower than 24": blocked and edge nailed ("flat blocked"); & end joints staggered
- Verify attic ventilation, 50% of the required ventilation area to be provided by ventilators located at least 3' above eave. (1203.2)

### "California roof frame" & low roof to shear wall

- verify full width bearing at California valley
- verify "back-nail" at California valley & low roof to shear wall
- Diaphragm Openings in Conventionally Framed Construction (Sec.2308.8.3, 2308.11.3.3 & 2308.12.6 6) (See Sec. 3: Underfloor Inspection)
- Ceiling joists blocked along bearing wall-lines or "strong-backs"
- If trusses are used, review city approved truss plans & details
  - verify trusses designed for lateral loads
  - verify truss-to-shear collectors, drag straps, & nailing complete
  - verify support at bearing points: point loads require bearing support as follows
  - more than 1,000 lbs and not greater than 2,000 lbs: (1) stud
  - more than 2,000 lbs and not greater than 4,000 lbs: (2) studs or 4 x
  - more than 4,000 lbs: engineering design required
  - toe nails are **not** allowed between truss and non-bearing walls; STC style clips **are** allowed, a gap between plate and bottom chord required
  - web bracing: compressive webs are laterally supported per truss details
- California frame and low roof to shear connections completed

22 of 63

TABLE A - ROOF RAFTERS (RR) SPAN TABLE											
RAFTER SPACING	SPECIES			MAX	(IMUM RA	AFTER SP	ANS				
				20	SLATE/TILE ROOFING						
	GRADE	2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
16"	D.F. S.S.	10'-5"	16'-4"	21'-7"	(577)	N <del>-10</del>	10'-5"	16'-0"	20'-3"	24'-9"	3 <del></del> .
	D.F. #1	10'-0"	15'-4"	19'-5"	23'-9"	<del>-</del>	9'-1"	13'-3"	16'-10"	20'-7"	23'-10'
	D.F. #2	9'-10"	14'-4"	18'-2"	22'-3"	25'-9"	8'-6"	12'-5"	15'-9"	19'-3"	22'-4"
	D.F. #3	7'-5"	10'-10"	13'-9"	16'-9"	19'-6"	6'-5"	9'-5"	11'-11"	14'-6"	16'-10'
24"	D,F. S.S.	9'-1"	14'-4"	18'-10"	23'-4"	A second	8'-11"	13'-1"	16'-7"	20'-3"	23'-5"
	D.F. #1	8'-7"	12'-6"	15'-10"	19'-5"	22'-6"	7'-5"	10'-10"	13'-9"	16'-9"	19'-6"
	D.F. #2	8'-0"	11'-9"	14'-10"	18'-2"	21'-0"	6'-11"	10'-2"	12'-10"	15'-8"	18'-3"
	D.F. #3	6'-1"	8'-10"	11'-3"	13'-8"	15'-11"	5'-3"	7'-8"	9'-9"	11'-10"	13'-9"

NOTE: THIS TABLE IS ONLY APPLICABLE TO RAFTERS WITHOUT CEILING ATTACHED.

**Table 5-1: Roof Rafter Span Table** 

TABLE B - CEILING JOIST (CJ) SPAN TABLE								
CEILING JOIST	SPECIES AND	MAXIMUM CEILING JOIST SPANS						
SPACING	GRADE	2x4	2x6	2×8	2×10			
	D.F. S.S.	11'-11"	18'-9"	24'-8"	===			
16"	D.F. #1	11'-6"	18'-1"	23'-10"				
10	D.F. #2	11'-3"	17'-8"	23'-0"	<del></del> 3			
	D.F. #3	9'-5"	13'-9"	17'-5"	21'-3"			
	D.F. S.S.	10'-5"	16'-4"	21'-7"	20			
24"	D.F. #1	10'-0"	15'-9"	20'-1"	24'-6"			
24	D.F. #2	9'-10"	14'-10"	18'-9"	22'-11"			
	D.F. #3	7'-8"	11'-2"	14'-2"	17'-4"			

NOTE: THIS TABLE IS ONLY APPLICABLE TO UNINHABITABLE ATTICS WITHOUT STORAGE

**Table 5-2: Ceiling Joist Span Table** 

TABLE	C - RAF	TER TI	E CON	NECTIC	NS	
		ROOF SPAN				
RAFTER SLOPE	TIE SPACING	12'	20'	28'	36'	
OLOIL	JI AOINO	NO. NAILS	OF 16 PER	d COME		
3:12	16"	5	7	10	13	
0.12	24"	7	11	15	19	
4:12	16"	3	5	7	8	
4.12	24"	4	7	10	12	
5:12	16"	3	4	5	7	
J. 12	24"	4	6	8	10	

**Table 5-3: Rafter Tie Connections** 

### 6. CONVENTIONAL FRAME WALL BRACING (2308)

- Verify previous inspections approved
- □ Fasteners into preservative-treated and fire-retardant treated wood: hot dip, zinc galvanized, stainless steel, **or** equal

# Conventional Framing Provisions for Braced Walls limited to portions of buildings with (sec. 2304, 2308.2.2, 2308.3, 2308.9.3 amended in MMC II-3-4 & 2308.11 & 12):

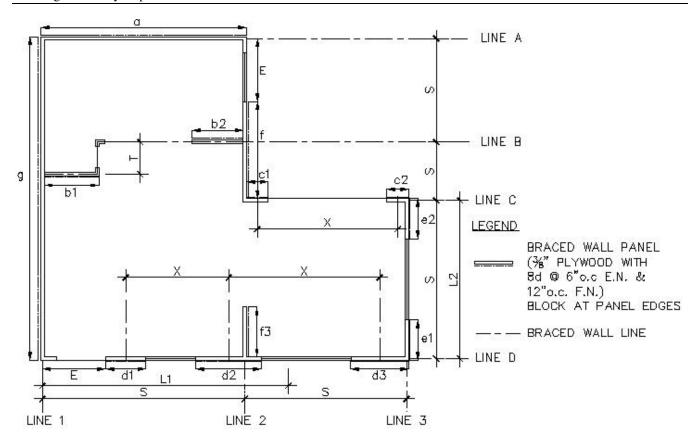
- □ Braced wall lines in two perpendicular directions
- □ Floor levels **not** vertically offset **unless** supported directly on foundations **or** joists lapped or spliced
- Openings in floor or roof diaphragms **not exceeding** 50% of the width between braced walls, **nor** 25% of the area bordered by braced walls (See Fig. 3-5)
- □ Braced wall panels **not** allowed over openings **unless**:
  - the header below is 4 x 12 minimum and spans 8'or less
  - or, the braced wall overlaps no more than 1'of the opening span (See figure 2308.12.6(5))
- □ **Walls vertically in-plane**: from the foundation to the uppermost story, **except**: **cantilevers & setbacks** allowed when
  - ratio of depth of cantilever & setback to depth of joists: 4: 1 maximum
  - 4' maximum cantilever or setback with 2 x 12 joists
  - joists: 2 x 10 minimum, at 16" oc minimum
  - ratio of joist back span to depth of cantilever: 2: 1 minimum
  - joists doubled at ends of braced wall panels
  - continuous rim required at end of cantilever
  - rim splices: **ST18** or equal (6-16d nails **each side** minimum)
  - gravity loads limited to wall and roof only
  - gravity loads limited to header spans of 8' or less
- Floor and roof diaphragms supported on all edges by braced wall lines
  - **except**: portions of roofs or floors **not** supporting braced wall panels above **may extend** up to 6' beyond a braced wall line (See figure 2308.12.6(4))

### Braced Wall Lines, Braced Wall Panels & Alternate Braced Wall Panels (sec.2308.9.3 & 2308.12)

- □ Braced wall lines required: (See Fig. 6-1)
  - along all exterior wall lines
  - at the interior at 25'intervals maximum
- Walls within a **braced wall line** may offset by **not** more than 4'
- □ Braced wall panels (sec. 2308.12.4 and MMC (Sec II-3-34): start within 8' of the end of a braced wall line

### Seismic hazard zone

- default  $S_{DS}$  value determines % of wall braced (**Table 2308.12.4**)
- □ high & mid hazard in Milpitas  $(S_{DS} \ge 1)$ :
  - 48% braced (12'braced per 25'of wall line)
  - first-story of two-story: increase bracing to 85% (Table 2308.12.4) and MMC (Sec II-3-34
  - lath: nailed at 6" oc to studs, plates or blocking with 11 gage x 1½" x 7/16" head nails minimum
- □ **Braced wall panels** extend from roof sheathing to continuous foundation, **except** at buildings **not** more than 50' wide (**Go to UNDERFLOOR section**)
- □ Braced wall panel approved materials (Table 2308.12.4, MMC sec.II-3-34):
  - wood structural panels (ply or OSB), diagonal boards, particleboard, fiberboard, & hardboard panels
  - portland cement plaster on studs spaced at 16" oc; for single story buildings only (R-3 & U occupancies)
  - nominal 1 x 4 let-in braces & gypsum board are **not** approved
- □ Replace existing drywall & 1 x 4 let-in braced wall panels damaged or removed during remodeling by approved materials & methods
- □ Braced wall panel (MMC Sec II-3-34 ):
  - 4' wide minimum
  - 10' high maximum
  - 2:1 height: width ratio maximum (4' x 8' or 5' x 10')
  - 3/8" ply or OSB
  - fasteners: 6" oc edge-nail, 12" oc field-nail, 8d nails, 3%" from edges minimum
  - sill nail: 6" oc **or** 3-16d's per 16" oc
  - frieze blocks & rims clipped 24" oc or nailed 6"oc (3-16d's per 16"oc)
- □ Verify top plate continuity at bearing walls, exterior walls and braced wall lines (sec.2308.9.2.1):
  - minimum plate splice: 4' overlap plate-to-plate, nailed with 8-16d's each side of the break, or
  - plates strapped at plate breaks and splices less than 4: 16 gauge, 1½" strap nailed with 8-16d's each side of splice
  - plates strapped at elevation changes: CS16, extended 2'beyond each side of splice, with 14-8d or 11-10d each side



### BRACED WALL REQUIREMENTS:

- 1. FIRST BRACED WALL PANEL TO BUILDING END (E)  $\leq 8'-0"$
- 2. OFFSET BETWEEN BRACED WALL PANELS ALONG EACH BRACED WALL LINE (T)  $\leq$  4'-0"
- 3. LENGTH OF EACH BRACED WALL PANEL (e.g. a1, b1, etc.)  $\geq$  4'-0"
- 4. SPACING BETWEEN BRACED WALL PANELS ALONG EACH BRACED WALL LINE (X) ≤ 25'-0"
- 5. SPACING BETWEEN BRACED WALL LINES (S) ≤ 25'-0"
- 6. SUM OF LENGTHS OF BRACED WALL PANELS PER EACH 25FT OF BRACED WALL LINE ≥ 12'-0". (e.g. IF L1 = 25', (d1+d2) ≥ 12') IF LENGTH OF BRACED WALL LINE < 25FT, SUM OF LENGTHS OF BRACED WALL PANELS SHALL BE MIN. 50% OF LENGTH OF BRACED WALL LINE. (e.g. IF L2 < 25', (e1+e2) ≥ 0.5xL2)
- 7. PANEL HEIGHT (BOTTOM OF SILL PLATES TO TOP OF TOP PLATES) TO PANEL WIDTH RATIO ≤ 2:1
- 8. BLOCKING/JOISTS SHALL BE PROVIDED UNDER AND IN LINE WITH BRACED WALL PANELS
- 9. BRACED WALL LINES SHALL BE SUPPORTED BY CONTINUOUS FOUNDATIONS. CONTINUOUS FOUNDATIONS NOT REQUIRED AT INTERIOR BRACED WALL LINES IF PLAN DIMENSION ≤ 50FT.
- 10. FOUNDATION ANCHOR BOLTS SHALL BE 1/2"0 @ 48"o.c. MAX. WITH 3"x3"x0.229"MIN. PLATE WASHER AND 7"MIN. EMBED. MIN. 2 ANCHORS PER PIECE OF SILL PLATE AND SHALL BE MIN. 4" & MAX. 12" FROM END OF SILL PL.

Fig 6-1: Braced Wall Requirements

### 7. SHEAR INSPECTIONS

### **Inspection procedure**

- □ The roof structure/nailing, interior shear, **and** exterior shear walls may be looked at in one inspection **or** separate inspections
- □ Each inspection includes the relevant shear system load path, including connections **and** support framing--no "ply only" inspections
- □ Sheathing at interior braced walls & shear walls may **not** be installed **until after** frame & insulation inspections **unless** walls remain open at (1) side
- □ Clarify scope of work deferred, if any, **until after** frame and insulation inspections (**"second side shear**)

### Holddowns, Anchor Bolts and Sill Nails

- □ Hold-downs installed per manufacturer's installation instructions **and** plan details
- □ **Retrofit HD's** inspected by special inspector **or** architect or engineer of record (city inspector may do the special inspection for epoxy anchors up to 8):
  - at the time of installation by observation, or
  - after installation by pull test, and
  - special inspection letter shall be available at the time of shear inspection
- ☐ Maximum HD to post offset: typically 1"offset maximum per 12" rise (based on manufacturer's specification)
- □ Shims at HD posts extend full height; short shims **not** allowed
- □ Sill bolting and/or nailing per plan (sec.2305.3.11 Exception & sec.2308.3.3)
  - 3x mudsill required **where** shear values greater than 350plf (Allowable stress design, ASD) (4:12, 3:12 & 2:12 nailing) unless substitute 2x mudsill with twice the required anchor bolts at
  - 4:12 **or** 3:12 nailing
  - Go to Sec. 3: Underfloor Inspection section for additional sill bolting info

### Posts, Straps, and Point Loads

- Posts and compression blocks properly sized and located
- ☐ Straps extended on posts for full nailing with specified nails
  - 3x or (2) 2x studs required at **adjoining** panel edges where
    - the shear design value exceeds 350 plf (ASD) (2305.3.11 Exception, Table 2306.4.1; note e-i; & 2307.1.1), or
    - shear panels are applied on both faces of the wall and nailing is closer than 6"oc on either side, and edges are not offset (Nails on each side shall be staggered.), or
    - shear panels at 3:12 and 2:12 nailing
  - (2) 2x posts and stud channels stitch nailed or clipped per shear schedule
- □ Point load support as noted at **roof structure/nail inspection**
- □ Manufactured wall panels at gable and rake walls require full height panels unless:

- roof to panel transfer details approved and
- horizontal diaphragm restraint provided (ceiling frame or bracing)

### **Shear Wall Sheathing**

- □ Verify shear plywood nailing complete & per plan: at sills, at panel joint, plates & boundary posts
- □ Plywood grade, # of plies & thickness per plan
- Nail heads don't penetrate face of plywood
- □ <sup>3</sup>/<sub>8</sub>" edge distance is required
- □ Nail size and spacing is per plan (edge nailing: field nailing)
- □ Staggered nailing is required at adjoining panel edges at 2:12 & 3:12 nailing and panels apply on both faces shear walls (footnotes f, h & I of Table 2306.4.1)
- ☐ Hot dip zinc galvanized, stainless steel, or equal fasteners at preservative-treated and fire-retardant treated wood
- □ Openings in shear panels shall be detailed on plans (2305.1.3)
- □ Shear wall lengths is per plan
  - at narrow shear walls: verify "as-built" shear wall effective length (Le)(2:1 height: width ratio and narrower)

### **Transfer Connections**

- □ Transfer connections between shear walls and roof & floor diaphragms are complete and per plan
- □ Drag blocks, straps and clips installed
- □ Horizontal diaphragm transfer length to shear wall length ratio varies by edge nail schedule
- □ Blocked diaphragms complete: blocking, collector straps and zone nailing per plan
- □ Shear transfers to top plates thru solid blocks or other approved methods
- □ Verify top plate splices are complete and per plan (Go to braced wall lines section)

### **Preview of upcoming inspections**

- □ Exterior weather tight & sub trades complete prior to frame inspection
- □ Frame includes egress, stairs, landings & railings, tempered glass, energy requirements, fireblocking & draftstopping, pre-rock and interior shear partials, room size, light & ventilation, attic access; and gravity load path (beams, posts and point loads)
- □ Roofing & lath inspections may either precede or be included with the frame inspection
- □ Clarify scope of work being deferred, if any

28 of 63

## 8. FRAME INSPECTION

- □ Sub trades (electrical, plumbing & mechanical roughs) complete
- □ Exterior weather tight at time of inspection

### **Structural Bearing**

- □ Studs:
  - allowable heights (**Table 2308.9.1**)
  - notching and boring limitations (sec.2308.9.10 & 2308.9.11) (See Fig. 4-2)
- □ Header spans & trimmer support (Table 2308.9.5 for Exterior Bearing Walls or Table 2308.9.6 for Interior Bearing Walls) (See Table 8-1)
  - Joist/rafter size and spacing (subfloor & roof frame tables and plans)
  - Verify beam & post sizes are per plan
  - Verify cantilevered glu-lam beams are V-8 type
- **□** Wood structural frame at decks and balconies:
  - self-supporting **or** positive connection required (**sec.1604.8.3**)
  - naturally durable **or** preservative-treated wood (**sec.2304.11.5**)

### **Exterior Emergency Escape and Rescue Openings (1026)**

- □ Bedrooms and sleeping rooms: (See Fig. 8-1)
  - width: 20" minimum
  - **height**: 24" minimum
  - sill height: 44" maximum, measured from finish floor to clear opening
  - clear opening: 5.7 sq ft minimum (821 sq inches) above grade floor
    - 5 sq ft minimum (720 sq inches) at grade floor openings
  - openings **not** allowed between private garages and sleeping rooms (406.1.4)
  - required egress **not** allowed through **screen rooms**
  - required egress allowed through **unenclosed patio covers** with ceiling heights 7' minimum, beam-to-floor clearance 6'8" minimum, **and** open on the longer side **and** at least one additional side
  - security grilles releasable or removable from the inside without the use of a key, tool, special knowledge or effort (1026.4)
- **□** Basements (1026):
  - all basements greater than 200 sq ft or at least 80" ceiling height, require at least (1) emergency egress, even if not habitable
  - all basements with habitable space, require at least (1) emergency egress
  - emergency egress required at each basement bedroom regardless of sq ft or ceiling height
  - window well: 3'x 3' minimum allowing escape window to open fully, steps or ladder 12"wide @ 18"o.c. projecting min. 3" and max. 6" from wall is required at greater than 44" depth of well (See Fig. 8-2)

### **Smoke Alarms (907.2.10.1.2)**

- □ Listed smoke alarms that comply with UL 217 & installed per NFPA 72:
  - new construction; or
  - valuation of addition, alteration, or repair greater than \$1000.00 and a building permit is required for scope of work (907.2.10.5.2; Health and Safety Code 13113.7 & 13114); or
  - one or more sleeping rooms are added or created in existing Group R occupancies; or
  - change of use from R-3 to R-3.1 (Residential Care Facility, maximum 6 occupants)
  - exceptions for exterior work **no longer allowed**:
    - re-roofs, chimney repairs, deck, balcony, and siding only permits: provide completion verification forms or access for inspection

### Required locations:

- one every floor including basements
- all rooms or hallways giving access to bedrooms
- · every bedroom
- at R-3.1 **also** required at all habitable areas **except** kitchens
- □ Alarms interconnected & power supply for alarms (907.2.10.2 & 3):
  - all required newly installed smoke alarms hard wired & interconnected with battery backup without disconnecting switch, **except**:
    - battery powered smoke alarms allowed in those areas of existing buildings where wall
      and ceiling finishes have not been removed,
    - or where no other electrical circuits have been added or extended direct power with battery backup required for new construction
- □ Smoke alarms audible in all sleeping areas of the dwelling

### Stairs for R-3 occupancies (1003, 1008; 1009, 1012 & 3403.4) (See Fig. 8-3)

- □ Replacement of previously code compliant stairs (1009.3 Exception 5 & 3403.4): may be likefor-like for rise and run where the existing space will not allow a reduction of pitch or slope
- □ Stairway clear width: 36" from top of hand rail to at least 80" above stair
  - **Projections of hand rails (1012.7)**: 4½" maximum (27" clear width minimum when rails each side)
- □ **Headroom** (**1009.2**): 80" minimum
- □ Variation (1009.3.2 & Exceptions) between all risers and between all treads
  - <sup>3</sup>/<sub>8</sub>" maximum
  - check floor & stair finish schedules for top & bottom riser consistency
  - **treads**: may slope ¼" per ft maximum for drainage (2 %)
  - marking stripe required at top/bottom tread adjoining sloped landing: less than 4" riser and 8% cross-slope maximum allowed (3" cross-slope maximum at 36"wide stairway)
- □ Riser dimensions (1009.3 Exception 4 & 1009.3.3 Exception 1):
  - 4" minimum and 7¾" maximum except adjoining sloped landings
  - 4" maximum **opening** in open riser

### □ Tread dimensions (1009.3 Exception 4):

- 10" minimum, measured nosing to nosing, except:
  - increase to 11" unless nosing between 3/4" and 11/4" with solid riser, and
  - increase to 13" where not more than (2) consecutive and less than 12" total rise with at least one handrail (1003.5 Exception 2)

### □ Winders (1009.3 Exception 4 & 1009.3.2): (See Fig. 8-4)

- 10" minimum tread, measured at walk-line (12" from side); and 6" at narrowest
- 3/8" maximum tread and riser variation
- □ **Spiral stairs** (**1009.8**): 78" headroom minimum; 26" width minimum, 9½" riser maximum; and 7½" tread minimum at walk-line (12" from side)
- □ Enclosed usable space under stairs (1009.5.3):
  - **interior stairs**: ½" sheetrock required on the enclosed side
  - exterior stairs: 1 hr fire-resistance-rated construction required
- □ Handrails (1012): (See Fig. 8-5)
  - required **each side** at exterior **and** (1) side at interior
  - required at (4) or more consecutive risers
  - handrail height: 34" minimum, 38" maximum, measured to top of rail
  - handrail extension required at exterior handrails (1012.5):
    - 12" beyond top riser, installed parallel to landing slope, and
    - continue to slope (1) tread depth beyond bottom riser
  - minimum clearance wall-to-rail (1012.6): 1½" minimum
  - ends (1012.5): return to wall, guard or walking surface
  - rail graspability (1012.3):
    - circular rails: 11/4" minimum and 2" max. diameter or
    - **non-circular rails**: 2<sup>1</sup>/<sub>4</sub>" cross-section max. **and** from 4" minimum to 6<sup>1</sup>/<sub>4</sub>" maximum perimeter dimension
  - without obstruction (1012.4 Exception 3): brackets and balusters wider than handrail not allowed within 1½" of bottom edge of rail
  - **openings at handrails used as guard(rails)**: 6" sphere maximum at riser/tread triangular opening, 43%" maximum between balusters at interior stairs

### **□ Guard(rails) (1013):**

- required at surfaces more than 30" above floor or grade
- required at roofs at HVAC **unless** at least 10' clearance from roof edge (1013.5) extending min. 30" beyond each end of equipment
- guard(rails) height to top of rail: 42", except
  - handrail used as guard(rail) at stairs: between 34" and 38" (See Fig. 8-5)
- **openings**: 4" sphere maximum, **except** 
  - at interior stairs: 4\%" maximum
  - **between bottom rail and stair**: 6" sphere maximum
- □ Landings (1008.1.4, 1008.1.5 & 1009):
  - Required **level landing** on each side of door **except:**

- a single step of 7.75"max. below top of threshold at exterior door, which does not swing over the landing
- door at top of interior stair and does not swing over the top step
- **depth**: 36" minimum (in direction of travel)
- required width: not less than stair or door width
  - 7" maximum reduction of required width for fully opened door
  - less than 50% reduction of required width for door swing encroachment
- maximum rise between landings (1009.6): 12'

### □ Thresholds (1008.1.6):

- ½"max. at all doors and bevel with 1v:2h slope when threshold exceeds ¼" except
  - at non-egress exterior door which does not swing over landing: 73/4" max
  - at interior side of sliding doors required for egress: 3/4" maximum

### □ Ramps (1010):

- 8.3% slope maximum (1" rise per 12" run); 2% cross-slope maximum (¼" per ft); 30" rise maximum between landings; 36" clear width minimum **between railings**; 80" headroom minimum; **and** slip-resistant surfaces
- ramp landings (1010.6.3):
  - maximum slope: 2% (1/4" per ft)
  - **minimum length**: 36" interior
  - landing width: not less than ramp width
- intermediate ramp landings (1010.6.4 Exception): 36" x 36" minimum
- **ramp handrails**: required each side at greater than 6" rise (1010.8); 36" clear width minimum (1010.5.1) and comply with stair rail provisions (**1012**)
  - handrails may be used as guard(rail) alongside ramps
- ramp guard(rails) as above for stairs
- curb & edge protection (1010.9): (See Fig. 8-6)
  - required at all ramps and landings **except** ramp with a rise 6" or less and with flared sides
  - 2" curb, **or**
  - rail centered between 2" and 4" above ramp surface (1114A.7), or
  - increase ramp and landing widths 12" beyond inside face of handrails

### **Room Dimensions (1208)**

- □ Corridor (hallway) widths (1017.2 Exception 3): 36" min.
  - Doors (1008.1.1)
    - exterior egress doors: 32" clear width minimum; 80" height minimum
    - **exterior non-egress doors**: 76" height minimum
    - **interior doors**: 78" height minimum
- □ Minimum ceiling heights (1208.2):
  - kitchens, bathrooms, storage, laundry & toilet rooms: 7' minimum
  - occupiable spaces, habitable spaces, corridors: 7'6" minimum, except
    - beams and girders (1208.2 Exception 1): 7' minimum clearance to beams and girders not closer than 4' oc

- sloped ceilings (1208.2 Exception 2): minimum height of 5' and at least half the floor area at 7'6" minimum within the required minimum habitable room area
- furred ceilings (1208.2.1): minimum height of 7' and at least 2/3rds the floor area at 7'6" minimum

### □ Habitable room size, other than kitchens:

- 70 sq ft minimum area
  - **except** at least (1) room 120 sq ft minimum
- 7' minimum dimension

### □ Kitchens (1208.1):

- 50 sq ft minimum
- 3' minimum clearance at counter fronts and appliances/walls

### **□** Bathroom clear areas (CPC 408.6 & 411.7):

- **toilet**: 24" minimum depth in front & 15" side clearance
- **shower**: 30" diameter circle minimum dimension & 1024 sq in minimum

### Garage & Carports (406)

- □ Fire separation protection between house and garage (R 3 & U) (406.1.4): (See Fig. 8-7)
  - 13/8" self-closing, self-latching, solid core door
  - openings from garages directly into sleeping rooms **not** allowed
  - walls: ½" drywall installed on garage side
    - drywall extends to roof sheathing (through crickets to highest roof), **unless** entire garage ceiling protected with ½" drywall
  - **ceiling**: 5/8" Type X drywall below habitable rooms
    - ½" drywall **whenever** wall protection not extended to (highest) roof sheathing
  - ducts: 26 gauge minimum; without openings into the garage (406.1.4(2))
  - **laundry boxes**: 26 gauge minimum or ½" sheetrock

### □ Garages (Table 704.8, 704.5, Table 602 note f):

- fire separation distance less than 5':
  - 1hr rated construction, **both sides** of wall
  - buildings exceeding 1000 sq ft (704.11 Exception 2 & 5): parapet or;
  - 4' minimum fire-retardant treated roof sheathing "wrap back" required **or**;
  - 5/8"Type X gypsum board directly beneath the underside of the roof sheathing supported by 2x ledgers on each side
- maximum area of openings at fire separation distance greater than 3' and not more than 5': 25% of area of exterior wall
- **fire separation distance 3' or less:** openings **not** allowed
- any portion of eaves and soffits at fire separation distance 3' or less (704.2):
  - protect entire soffits area **and** vent openings **not** allowed
  - eaves and soffits not allowed less than 2' to property line
- gas utilization equipment in garages and in rooms on the garage side of house/garage fire separation that open into garages:

- protection from burners & burner ignition devices (CPC 508.14): raised 18" above floor, except listed as flammable vapor ignition resistant type (FVIR) water heaters
- protection from vehicles (CPC 508.17): by raised platform, bollard or location
- □ Attached garage (406.1.2): 3000sq ft maximum unless fire wall separation between each area
- □ Carports (406.1.4):
  - **fire separation protection not** required between carport and house **if** open (2) sides and without enclosed areas above
  - Detached carports:
    - fire separation distance less than 5': requires 1hr rated construction, protected both sides
      of wall
    - fire separation distance greater than 3' and not more than 5': maximum area of openings not to exceed 25% of area of exterior wall
    - fire separation distance 3' or less: openings not allowed

### Fireblocks and Draft Stops: Concealed Spaces (717)

- □ Fire blocking in combustible construction (717.2):
  - 2" lumber, 2 layers of 1 x, 23/32" structural plywood, 3/4" type 2-M particle board, gypsum, cement fiber board, or
  - glass fiber, or mineral wool, securely retained in place
  - loose fill insulation **not** allowed **except** as part of a tested assembly
  - plate penetrations sealed at top and bottom plate-lines (717.2.2(1))
  - horizontally in walls/furred spaces at 10' oc
  - vertically in walls/furred spaces at ceiling and floor lines only
  - between vertical & horizontal spaces at soffits, drop or cove ceilings, and furred spaces
  - concealed spaces between stair stringers at top and bottom of the run
  - openings around vent pipes, ducts, chimneys, fireplaces, and at floor and ceiling levels
    - use non-combustible materials at chimney/fireplace; 2" minimum clearance to fireplace, filled by 1" thick mineral wool compressed to 40% and secured by metal lath or 26 gauge sheet metal (2111.12)
    - first floor, raised floor tub firestop (CPC 313.12.4): approved metal collar or metal screen required
  - **between slabs & wooden sleepers**: at 100 sq ft maximum **and** at wall lines
- □ Draft stops in combustible construction for R-3 (717.3 & 4):
  - ½" gypsum, ¾" plywood, ¾" particle board, mineral wood
  - dwelling unit separations at floor-ceiling (717.3.2)
  - **dwelling unit separations at attics** (708.4 Exception 7):5/8" Type X ceiling plus attic draft stop **unless** fire barrier extends to roofline
  - attics and concealed roof spaces: at 3000 sq ft maximum (717.4.3)
  - openings thru draft stops: protected by self-closing, auto-latching doors
  - **not** required in sprinklered buildings

### Light and Ventilation (1203.4, 1205, ASHRE 62.2-2007, 2008 Energy Standards)

□ **2008 Energy Standards** become effective January 1, 2010

- □ Verify U-Factor & SHGC of windows: labeled and matches **CF-1R** form
  - **Package D**: 0.40 U-factor and 0.40 SHGC **and** HERS duct test only required for new construction or addition over 1000 sq. ft.
- Maximum allowable glazing area based on total floor area added, sq footage of demo'd glazing & wall orientation:
  - additions up to 100 sq ft:
    - not more than 50 sq ft total glazing without other limitations
    - more than 50 sq ft glazing: use provisions for additions up to 1000 sq ft
  - additions up to 1000 sq ft: glazing limited to 20% of conditioned floor area and west facing glazing limited to 5% increased by total area of glazing removed due to addition
  - additions more than 1000 sq ft: no increase for removed glazing
- □ Light (1205.1) and ventilation (1203.1) may be natural or artificial/mechanical
  - artificial light (1205.3): 10 Foot candles at 30" throughout
  - natural light (1205.2): 8% of floor area minimum
    - light from adjoining rooms included when (1205.2.1 & Exception):
      - common wall area open & unobstructed:
        - not less than 50% of the common wall area
        - **not** less than 10% of the floor area of the interior room
        - and not less than 25 sq ft
        - except adjoining sunrooms or patio covers: not less than 20 sq ft glazing and not less than 10% of interior room floor area
  - **natural ventilation (1203.4.1)**: 4% of floor area minimum openable and ventilated space shall be within 25 ft of the opening (CMC 402.2.1).
    - ventilation from adjoining rooms included when (1203.4.1.1):
      - common wall area **open & unobstructed**:
        - **not** less than 8% of the floor area of the interior room
        - and not less than 25 sq ft
        - except adjoining sunrooms or patio covers: not less than 20 sq ft openable area
           and not less than 8% of interior room floor area
  - screen rooms, patio covers & carports providing light & ventilation require 7' minimum ceiling height & at least 65% open for light
  - windows open onto 3' minimum yards
- □ Bathing facilities ("bathrooms" with showers, spas, and/or tubs) require mechanical ventilation at 50 cfm minimum intermittent local exhaust (CMC Table 4-4, ASHRAE Standards 62.2-2007 Table 5.1) (CBC 1203.4.2.1)
- □ Toilet rooms (except as part of bathrooms) and laundry rooms (except with dryer ducts) natural ventilation required: 4% of floor area minimum openable and 1.5 sq ft openable area (ASHRAE Standards 62.2)
- □ New construction (2008 Energy Code): kitchens require mechanical ventilation
  - mechanical ventilation: 5 air changes per hour continuous or 100 cfm intermittent local exhaust (ASHRAE 62.2-2007, Table 5.1 & 5.2)

### Attic Ventilation (1203.2) (See Fig. 8-8)

- □ 1 sq ft minimum per 150 sq ft of attic area
  - 1 sq ft minimum per 300 sq ft of attic area if approved vapor retarder used at conditioned side
- □ 50% located at least 3' above eave **and** 50% at eave vents
  - verify ridge vent does **not** compromise required shear
- □ Corrosion resistant wire mesh screen or equal required: ½" minimum and ¼" maximum (¼" minimum if mechanical equipment)
- □ Cathedral ceilings require ridge and eave vents, and 1" minimum airspace between insulation and roof sheathing
- □ Check for isolated and un-vented attic spaces

### Fall protection at windows with sills more than 6' above grade (1405.12.2)

□ **Sill height above finished floor**: 24" minimum **unless** guarded, fixed **or not** more than 4" sphere opening

### Safety Glazing (2406.3)

- □ Shower, tub, whirlpool, hot tub, sauna & steam room enclosures (including walls) (2406.3 (5)): bottom exposed edge of glazing less than 60" above standing surface
- □ Doors (2406.3 (1-4) & 2406.3.1 Exceptions): all glazing unless decorative or not greater than 3" sphere
- □ Adjacent doors (2406.3 (6) & Exception 1 & 3): (See Fig. 8-9)
  - all glazing within a 24" radius of either vertical edge of the door in a closed position **and** less than 60" above the walking surface
  - except at perpendicular walls **not** in the direction of door swing **or**
  - where a wall or barrier intervenes between the door and glazing
- □ Adjacent stairways, landings, ramps (2406.3 (10) & Exception): (See Fig. 8-10) all glazing within 36" horizontally of a walking surface and bottom edge less than 60" above the walking surface, and 18" or less from handrail or guardrail
- □ Adjacent bottom tread of stairways (2406.3 (11) & Exception): (See Fig. 8-11) all glazing within 60" in any direction and bottom edge less than 60" above the tread nosing; and 18" or less from handrail or guardrail
- □ Guardrails (2406.3 (8)): all glazing
- □ Adjacent pools, hot tubs and spas (2406.3 (9)):all glazing within 60" of the water's edge and bottom edge less than 60" above the walking surface
- □ Within 36" of a walking surface (2406.3 (7)): (See Fig. 8-12) all glazing greater than 9 sq ft and bottom edge less than 18" above the floor and top edge greater than 36" above the floor and not protected by guardrail at 34" to 38"

#### **Protection from Water Damage (2509.3)**

- ☐ Green board **not** allowed at showers & tubs **unless** vapor barrier **between** drywall and tile:
  - green board not allowed at areas of "continuous high humidity," "direct exposure to water," or over a vapor barrier
- □ **%"green board on ceilings**: 16" oc max. framing support
- □ ½"green board on ceilings: 12" oc max. framing support

#### Lath (2510.6, 1405.3, 2512, ASTM C 841-03, 1032-04 & 1063-03)

- □ Diamond mesh lath (ASTM C 1063-03, Table 3):
  - framing support at walls: 16" oc max., unless installed over sheathing
  - framing support at soffits and ceilings: 12" oc max.
- □ Continuous water-resistive barrier required behind all exterior wall veneers (1404.2):
  - one layer 15 lb asphalt felt or equal (ASTM D 226 Type 1)
  - over sheathing: two layers type D paper or equal required (2510.6)
- □ Flashing (1405.3):
  - windows, doors, **and** wall ends, penetrations & intersections with roofs, chimneys, porches, decks, balconies & similar projections flashed, counter flashed & caulked
  - under sills and continuously above projecting trim: flashing with projecting flanges required
- □ Lap paper-to-paper and wire-to-wire (ASTM C 1063-03):
  - paper laps: 2" minimum horizontal seam
    - repair or seal damage at existing lath
  - wire laps: (1) diamond minimum
  - metal lath: ½" minimum side lap and 1" minimum end lap
    - lap wire & metal lath directly over flanges (paper over flange **not** allowed)
  - lath installed so water flows to exterior (lapstraked or weatherboarded)
- **□** Fasteners (ASTM C 1063-03):
  - 7" oc to **all** framing members
    - increase fastener lengths at lath installed over sheathing penetrating structural members not less than 3/4"
  - nails: 11 gage, 7/16" head, barbed, galvanized roofing or common
    - minimum penetration into framing at walls: 3/4"
    - minimum penetration into framing at soffits & ceilings: 1½"
  - staples: 3/4" crown x 1" at walls and x 13/4" at soffits & ceilings
    - staples **not** allowed **if** stucco is used for **braced walls**
- □ Corners reinforced (ASTM C 1063-03)
- □ 3½" weep screed (2512.12 & ASTM C 1063-03):
  - above earth: 4" minimum
  - above paved areas: 2" minimum

- **below mudsill**: 1" minimum
- □ Control joints required at 144 sq ft maximum in walls and 100 sq ft maximum in ceiling and not more than 18' oc (ASTM C 926 & 1063)
- □ Casing bead required (ASTM C 926 & 1063):
  - between load bearing and non-load bearing
  - between soffits and walls
- □ Vinyl siding (1404.9): verify ASTM D 3679 labeled
- □ Check Planning approved elevations if applicable

TABLE F	- HEAD	ER (HD)	SPAN	TABLE FO	R EXTE	RIOR WAL	20	
HEADERS SUPPORTING	HEADER SIZE*	MAXIMUM BUILDING WIDTH (W)						
		20'-0"		28'-0"		36'-0"		
		SPAN	NJ	SPAN	NJ	SPAN	NJ	
1015011101111	2-2x4	3'-6"	1	3'-2"	1	2'-10"	1	
ROOF & CEILING	2-2×6	5'-5"	1	4'-8"	1	4'-2"	1	
	2-2x8	6'-10"	1	5'-11"	2	5'-4"	2	
	2-2x10	8'-5"	2	7'-3"	2	6'-6"	2	
	2-2×12	9'-9"	2	8'-5"	2	7'-6"	2	
	3-2x8	8'-4"	2	7'-5"	2	6'-8"	2	
	3-2x10	10'-6"	2	9'-1"	2	8'-2"	2	
	3-2x12	12'-2"	2	10'-7"	2	9'-5"	2	
	4-2x8	9'-2"	2	8'-4"	2	7'-8"	2	
	4-2x10	11'-8"	2	10'-6"	2	9'-5"	2	
	4-2x12	14'-1"	2	12'-2"	2	10'-11"	2	

NJ = NUMBER OF JACK STUDS REQUIRED TO SUPPORT EACH END

	TABLE C	- FLOOR GIR	DER (FG) SPAN	TABLE		
GIRDER	GIRDER	MAXIMUM BUILDING WIDTH (W)				
SUPPORTING	SIZE*	20'-0"	28'-0"	36'-0"		
ONE FLOOR ONLY	2-2x4	3'-1"	2'-8"	2'-5"		
	2-2x6	4'-6"	3'-11"	3'-6"		
	2-2×8	5'-9"	5'-0"	4'-5"		
	2-2x10	7'-0"	6'-1"	5'-5"		
	2-2x12	8'-1"	7'-0"	6'-3"		
	3-2×8	7'-2"	6'-3"	5 <b>'</b> -7"		
	3-2×10	8'-9"	7'-7"	6'-9"		
	3-2x12	10'-2"	8'-10"	7'-10"		
	4-2x8	9,-0,	7'-8"	6'-9"		
	4-2x10	10'-1"	8'-9"	7'-10"		
	4-2x12	11'-9"	10'-2"	9'-1"		

TABLE H	- EQUIVAL	TENT SEC	HUN PRUPI	בעוובס
SIZE	2×	3×	4×	6×
2-2×4	2x6	3x6	4×4	6-
2-2x6	2x10	3x8	4x6	9 <del></del>
2-2×8	2x12	3×10	4×8	6×6
2-2x10		3x12	4x10	6x8
2-2x12	3-2x10	2-3x10	4x12	6x10
3-2x8	2-2x10	3x12	4x10	6x8
3-2×10	2-2×12	2-3×10	4×12	6×10
3-2×12		2-3×12	2-4×10	6x12
4-2x8	2-2X12	3x12	4x10	6x8
4-2×10	3-2X12	2-3×12	2-4×10	6×10
4-2x12		3-3x12	2-4×12	6x12

**Table 8-1: Header Span Table** 

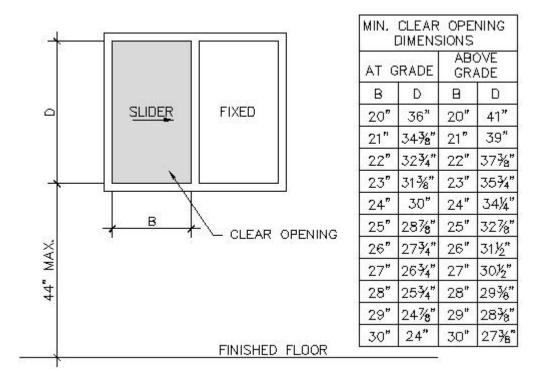


Fig 8-1: Emergency Escape Window

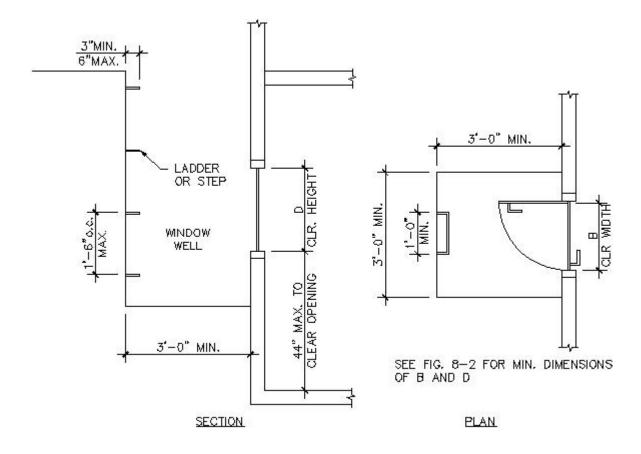


Fig 8-2: Window Well for Emergency Escape Window in Basement

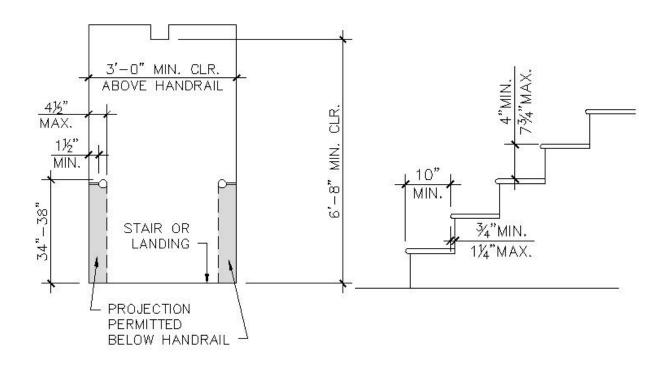


Fig 8-3: Stair and Handrail Requirements

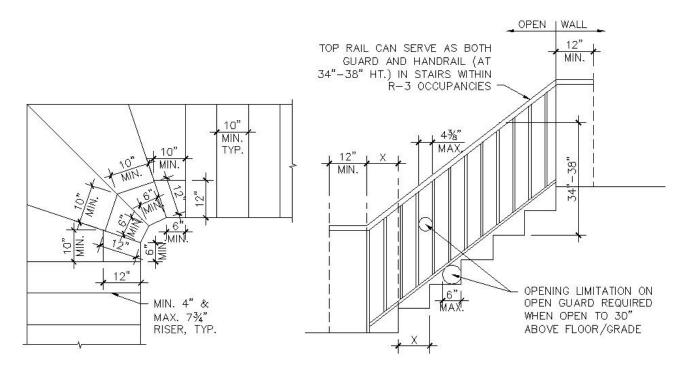


Fig 8-4: Winder Treads

Fig 8-5: Guard and Handrail for Stairs in R-3

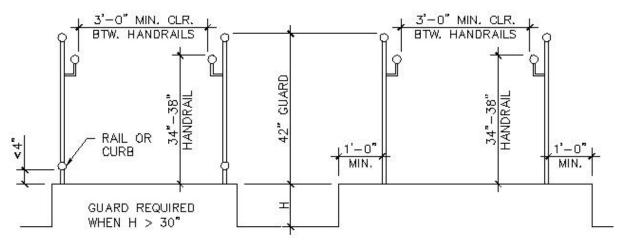


Fig 8-6: Ramp Edge Protection

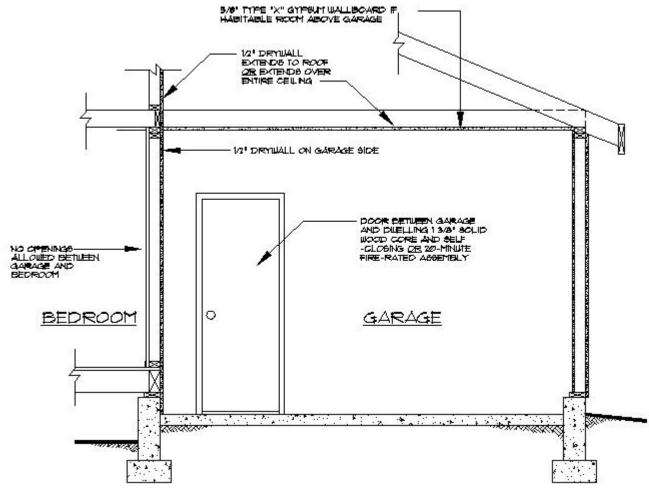
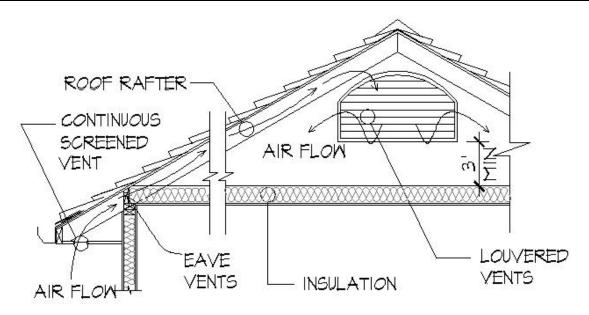


Fig. 8-7: Garage and Dwelling Unit Separation



#### **Attic**

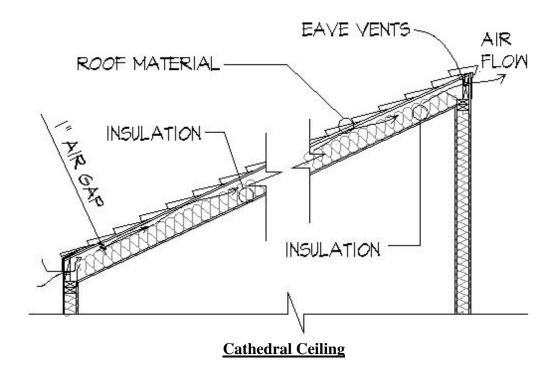
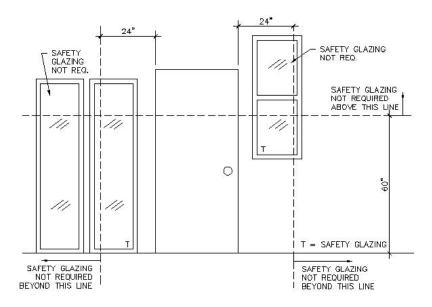


Fig. 8-8: Attic Ventilation



#### **Elevation**

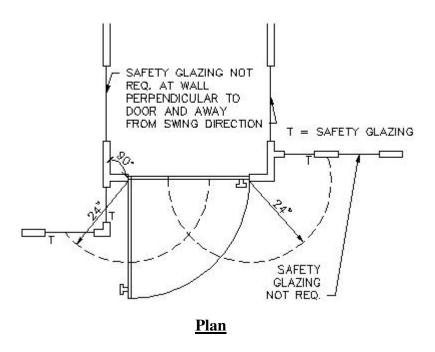


Fig 8-9: Safety Glazing Adjacent to Door

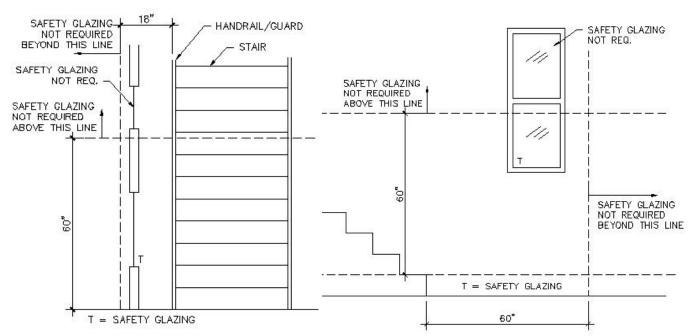


Fig. 8-10: Safety Glazing Adjacent to Stair

Fig. 8-11: Safety Glazing Adjacent to

Bottom Tread

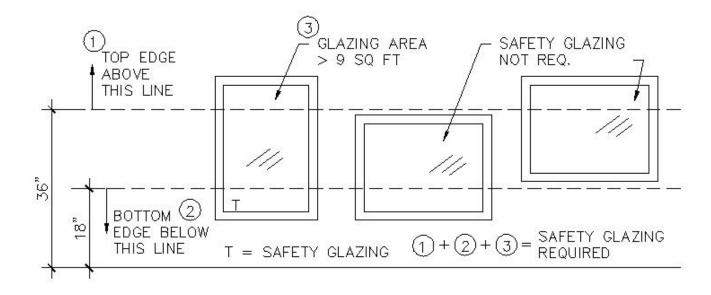


Fig. 8-12: Safety Glazing Within 36" of Walking Surface

# 9. WOOD BURNING APPLIANCES

#### **New construction**

- Only gas fireplaces, pellet-fueled devices, U.S. E.P.A. Phase II certified wood-burning devices, or devices listed on the Air District's list of approved devices may be installed in any new construction.
- □ Conventional fireplaces and non-approved devices are not permitted after January 1, 2009

#### **Existing Structures**

Only gas fireplaces, pellet-fueled devices, U.S. E.P.A. Phase II certified wood-burning devices, or devices listed on the Air District's list of approved devices may be installed in any new construction may be added to or replace wood-burning appliances.

#### **Conversions**

 Conversion of a gas fireplace to burn wood shall constitute an installation of a wood burning appliance

#### Reconstruction/Repair

- A wood burning appliance shall comply with new wood burning appliance provisions if it is:
  - (1) reconstructed, or
  - (2) additions, alterations, or repairs are made to the appliance that require opening up immediately-adjacent walls, or
  - (3) the residential unit in which the appliance is located is renovated, and the renovation includes opening up wall immediately adjacent to the appliance.
- □ **Freestanding wood stoves** shall be EPA labeled:
  - "U.S. ENVIRONMENTAL PROTECTION AGENCY Certified to comply with July, 1990 particulate emission standards.", **or**
  - "U.S. ENVIRONMENTAL PROTECTION AGENCY Certified under 40 CFR 60.533 (h), to comply with July, 1990 particulate emissions standards."
- □ Current list of certified stoves is available from the EPA Residential Wood Heater website @ http://www.epa.gov/oecaerth/monitoring/programs/caa/woodheaters.html
- □ Appliances installed per manufacturer's installation instructions:
  - installation instructions shall be provided at the time of inspection
  - verify hearth underlayment installed, i.e. MICORE 300, if required
- □ **Go to mechanical section** for additional requirements

## 10. MASONRY FIREPLACE (2111)

#### **Chimney Repair (2111.3 & 4)**

- □ Tear down the damage section past the problem area. Expose a minimum of 24" of existing reinforcing bars to tie in new work. If no reinforcement is found, chimney must be torn down to foundation.
- □ If restarting from foundation drill 5/8" by 8" deep holes in existing foundation and install four (4) ½" diameter (#4) steel reinforcing bars with approved epoxy. Building Inspector shall review epoxy prior to installation.
- □ Void between the exterior and the firebox must be completely filled prior to starting of "Shoulder" and "Chimney" reconstruction.
- □ Flue liner shall be bedded in mortar **and** joints smoothed on the inside
- □ Spark arrestor required at final inspection (2113.9.1)
- □ Cricket or saddle required at chimney greater than 30" wide (1507.2.9.4)
- □ Damper required at solid-fuel burning fireplace (2111.7.1)
- □ Damper shall be **removed or fixed open** at **decorative appliances in vented fireplaces (CMC)**

#### Hearth (2111.9 & 10)

- 4" minimum thickness of non combustible material & non combustible support, or equivalent
- ☐ Hearth extension:
  - 2" minimum thickness of non combustible material **or equivalent** (MICORE 300 hearth underlayment or similar)
  - hearth extends 16" front & 8" beyond sides at less than 6 sq ft opening
  - hearth extends 20" front & 12" beyond sides at 6 sq ft or more opening
- ☐ Hearth, mantle, and glass doors are installed by final inspection (energy code & installation instructions)

#### Clearances to Combustibles (2111.11, 2113)

- □ Clearances from masonry fireplaces and chimneys to combustibles:
  - 2" minimum within an exterior wall (2111.11 & 2113.19), except
    - clearance not required at exterior sheathing 12" from inside surface of flue liner (2113.19 Exception 2 & 3) and 12" from front of firebox (2111.11 Exception 2 & 3)
  - 2" minimum anywhere within the interior of a building (2111.11 & 2113.19)
  - 1" minimum at chimneys thru soffits outside of buildings (2113.19)
  - 4" minimum from back face of **fireplace** (2111.11)
  - **fire blocks at masonry fireplaces and chimneys**: use non-combustible materials (1" thick mineral wool compressed to 40%) **and** secure with metal lath or 26 gauge sheet metal (2111.12 & 2113.20)

#### Combustion Air (2111.13)

- □ 6 sq in minimum outside and not more than 55 sq in combustion air required
- □ Screened opening required
- □ Not from garage, attic, basement, crawlspace; nor higher than the firebox

48 of 63

9. Masonry Fireplace

## 11. ROOFING (1507 & 1510)

#### Re-roof Inspections (CPC, CMC, & 1510)

- □ Pre-Roofing Inspection
  - Roof Nail Inspection
  - In-progress inspections are optional, unless part of shear & roof nail, or rated wall inspections
  - Smoke detector and spark arrestor inspection
  - CF-6R-ENV-01: Required to be posted to obtain a final inspection if a COOL ROOF was installed.
- □ Final Inspection
  - CF-6R-ENV-01: Required to be posted to obtain a final inspection if a COOL ROOF was installed.
  - Permit holder shall provide permit, installation instructions, correction notes if any, ladder(s) and safe access to each roof level
- □ Overlaying existing roofing (1510):
  - overlay maximum (1) layer (1510.3.3), and
  - remove all layers if existing roof covering (2) layers (1510.3.3), and
  - remove existing wood shake, tile, or slate completely (1510.3), except
    - metal, concrete and clay tile allowed over wood shake with fireblocking installed (1510.3 Exception 2 & 1510.4)
    - required fireblocking between existing wood shingle or shake and furred overlay: sheetrock, mineral wool, or fiberglass insulation secured in place
- □ Check if the flue has been cut, removed or replaced, changed to low profile type, **or** if roof deck has been raised above flue termination (**CMC**)
- □ 1" minimum clearance at **B vents & BW vents**, or per listing (CMC)
- □ Roof drains, separate overflow drain or scupper, and strainer as needed (CPC 1101.11)
- □ Cricket, saddle, **or** diverter required at chimney greater than 30" wide (**1507.2.9.4**)
- □ Elastomeric gaskets **or** 10 mil tape required at plumbing vents
  - ABS and PVC protected with water based synthetic latex paint (CPC)
- Verify flashing and counter flashing complete
  - metal flashing 26 gauge corrosion resistant, or equivalent (1503.2.1)
  - primer required at metal flashing where bituminous flashing adhered (1510.6)
  - counter-flashing required where flashing abuts vertical surfaces
- □ Ply edges sealed by drip edge or gutters (1507.2.9.3)
- → Skylights:
  - permit, plans and attic inspection required for skylights, except
    - non-structural alterations do **not** require approved plans
  - structural alterations include modifications of trusses **or** opening width greater than 4'0"; **and** require plan review, inspection of the roof framing & insulation, **and** installation of smoke alarms for final inspection

- verify clearances to vents and flues at **openable skylights** (CPC & CMC)
- dual glazing & SHGC per Energy Code
- Go to roof structure section for framing requirements
- verify energy code requirements
- □ Cool roofs required if 5 lbs per sq ft or more (2008 Energy Code) and slope over 2:12 in new construction or addition over 1000 sq ft or more than 50% or 1000 sq ft of re-roof:
  - unless R .85 over roof sheathing or 3/4" airspace between sheathing and roofing
  - or unless radiant barrier, or duct insulation and sealing, or no ducts or R-30 at attic
- □ **Fasteners** per installation instructions and CBC tables, **and** 
  - seal exposed nails
  - increase fastener lengths at ridge as needed
  - renail fasteners as needed if
    - penetrate thru surface of roofing material
    - placed above or below head lap
  - **not** allowed thru valley flashing
- □ Fire retardant-treated wood shakes required at re-roofs greater than 50% of total roof
- □ Additional requirements for specific materials listed below

#### Asphalt Shingles (slopes 2:12 or greater) (1507.2)

- Provide manufacturers installation instructions
  - verify ASTM D 3161 listed **and** labeled (**1507.2.5**)
- □ Solidly sheathed decks required (1507.2.1)
- □ Underlayment (1507.2.3 8):
  - 15 lb underlayment required **unless** overlaying existing comp
  - slopes 2:12 to 4:12 require (2) layers of 15 lb underlayment (1507.2.8)
    - 19" starter course **and** 36" overlapping
- □ Shingles self sealing or interlocking, **regardless** of roof slope (1507.2.5)
- □ **Fasteners** per installation instructions and (1507.2.6 &7):
  - **nails** (**1507.2.6**): 12 gage <sup>3</sup>/<sub>8</sub>" heads
  - **staples** (**1507.2.6**): 16 gage 5/16" crown
  - galvanized, stainless steel, aluminum, or copper (1507.2.6)
  - (4) per strip **or** (2) per individual shingle minimum (**1507.2.7**)
  - penetrate 3/4" minimum into and/or thru sheathing thickness (1507.2.6)
  - mansard roofs or other steep slope roofs 20 : 12 slope per manufacturer's installation instructions (1507.2.7)
- □ **Drip edge** (**1507.2.9.3**): required at exposed edges of sheathing at gables & eaves: extends under underlayment 2", extends below sheathing ½" minimum, fastened 12" oc, **and** ends lapped 2" minimum

#### Wood Shake (slopes 4:12 or greater) (1505.6 & 1507.9)

- □ Fire retardant-treated required for new construction, additions, and reproofs greater than 50%
- □ Sheathing (1507.9.1):
  - solidly sheathed **or** 1 x 4 skip sheathing spaced to coincide with the placement of fasteners and at less than 10"o.c. on **existing roofs**
  - solidly sheathed on new, additions, and/or existing for **seismic**
- □ **Slopes** (**1507.9.2**): 4:12 minimum
  - **except** 3:12 slope allowed at partial re-roofs
- **□** Underlayment (1507.9.3)
  - 15 lb underlayment required **unless** overlaying existing comp
- □ Interlayment (1507.9.4 & ASTM D226 Type I).: 15 lb x 18" minimum interlayment required shingled between each course of shakes
- □ Fasteners (1507.9):
  - **nails**: corrosion-resistant, (2) per shake minimum
  - length (Table 1507.9.7): penetrate <sup>3</sup>/<sub>4</sub>" minimum into and/or thru sheathing thickness
- □ **Exposure** (**Table 1507.9.7**): most commonly 10" maximum
- □ **Side-lap** (**1507.9.7**): 1½"minimum
- □ Side-gap (1507.9.7): ¾" minimum and ¾" maximum between shakes
- □ Flashing and counter-flashing (1507.9.8):
  - **counter-flashing** required where flashing abuts vertical surfaces
  - **metal flashing** 26 gauge corrosion resistant, or equivalent
  - valley flashing: 11" from centerline, 1" diverter rib, 4" end lap

#### Wood Shingle (slopes 3:12 or greater) (1507.8)

- □ Sheathing (1507.8.1):
  - solidly sheathed **or** 1 x 4 skip sheathing spaced to coincide with the placement of fasteners on **existing roofs**
  - solidly sheathed on new, additions, and/or existing for **seismic**
- □ **Slope** (**1507.8.2**): 3:12 minimum
- □ Underlayment (Table 1507.8):
  - 15 lb underlayment required unless overlaying existing comp
- □ **Fasteners** (1507.8.5): corrosion resistant, (2) per shingle; ¾" minimum penetration
- □ **Side-lap** (**1507.8.6**): 1½"minimum
- □ Side-gap (1507.8.6):  $\frac{1}{4}$ " minimum and  $\frac{3}{8}$ " maximum between shingles
- □ Exposure (Table 1507.8.6): varies by roof slope, and shingle length & shingle grade
- □ Flashing (1507.8.7):

- **counter-flashing** required where flashing abuts vertical surfaces
- **metal flashing** 26 gauge corrosion resistant, or equivalent
- valley flashing: 11" from centerline, 1" diverter rib, 4" end lap

#### Tile (installed per manufacturers installation instructions & 1507.3)

- □ Cool roofs required if 5 lbs per sq ft or more in new construction or addition over 1000 sq ft or more than 50% or 1000 sq ft of re-roof (2008 Energy Code):
  - minimum aged solar reflectance: 0.15
  - minimum thermal emittance: 0.75
  - minimum SRI: 10
- □ Sheathing (1507.9.1):
  - solidly sheathed or 1 x 4 skip sheathing on existing roofs
  - solidly sheathed on new, additions, and/or existing for **seismic**
- □ **Slope** (**1507.3**): 2½:12 minimum
- **□ Underlayment** (1507.3.3):
  - at valley flashing at slopes 3:12 require 36" wide minimum underlayment
  - slopes greater than 4:12 require (1) layer of 15 lb underlayment
  - low slopes up to 4:12 require (2) layers of 15 lb underlayment
    - 19" starter course and 36" overlapping
- □ **Structural loads:** Lightweight tile (5 to 6 lbs per sq ft maximum) required **unless** roof structure designed to support additional loads
- **Fasteners**: installed per manufacturers installation instructions **and** Table 1507.3.7
  - lightweight tile (6 psf maximum): (2) nails per tile, except
    - (1) nail per tile at
      - slopes at 2½:12 other than flat tile without vertical laps
      - interlocking tile with projecting anchor lugs, regardless of slope
  - heavy weight tile (greater than 6 psf): (1) nail per tile, except
    - slopes at 2½:12 at flat tile without vertical laps: (2) nails per tile
    - interlocking tile with projecting anchor lugs over battens
      - slopes less than 5:12: fasteners not required
      - slopes 5:12 and less than 12:12: (1) nail per tile at 3' boundary perimeter, and (1) nail per tile every other row at field
  - **nails**: corrosion-resistant, 11 gage; 5/16" head; 3/4" minimum penetration
  - wire ties: .083" corrosion-resistant
- □ Flashing (1507.3.9):
  - **counter-flashing** required where flashing abuts vertical surfaces
  - **metal flashing** 26 gauge corrosion resistant, or equivalent
  - valley flashing: 11" from centerline, 1" diverter rib, 4" end lap
- □ **Tile over wood shingle/shake (1510.5)**: requires firestopping of entire concealed space with sheetrock, rock wool, or fiberglass insulation
- **□** Battens:

- 1" x 2"
- installed with provision for drainage
- at slopes greater than 7:12: horizontal battens required

# <u>Metal Roof Shingles (slopes 3:12 or greater) (installed per manufacturer's installation instructions & 1507.5)</u>

- □ Provide manufacturers installation instructions
- □ Sheathing (1507.5.1):
  - solidly sheathed **or** closely fitted sheathing on **existing roofs**
  - solidly sheathed on new, additions, and/or existing for seismic
- □ **Slope** (**1507.5.2**): 3:12 minimum
- **□ Underlayment (1507.5.3.)**:
  - 15 lb underlayment required **unless** overlaying existing comp **or**
  - per manufacturer's instructions
- □ **Fasteners** (1507.5.5): per installation instructions
- ☐ Flashing (1507.5.6):
  - **counter-flashing** required where flashing abuts vertical surfaces
  - metal flashing 26 gauge corrosion resistant, or equivalent
  - valley flashing: 8" from centerline, 3/4" diverter rib, 4" end lap
- □ Metal tile over wood shake (1510.3 Exception 2): requires firestopping of concealed space with sheetrock, rock wool, or fiberglass insulation

# <u>Mineral Surfaced Roll Roofing (slopes 1:12 or greater) (installed per manufacturers installation instructions & 1507.6)</u>

- □ Provide manufacturers installation instructions
- □ **Sheathing (1507.6.1)**: solidly sheathed only
- □ **Slope** (**1507.6.2**): 1:12 minimum
- □ Underlayment (1507.6.3.):
  - 15 lb underlayment required **unless** overlaying existing comp **or**
  - per manufacturer's instructions

#### **Built-Up Roofs (slopes 1/4":12 or greater) (1507.10-15)**

- □ Provide manufacturers installation instructions
- □ **Slope**: <sup>1</sup>/<sub>4</sub>":12 minimum

#### **Preview of upcoming inspections**

- □ Clarify corrections & discrepancies still pending from previous corrections
- Sub trades finals shall be complete prior to final building inspection approval
- □ Grading, landings, energy, tempered glass completed

# 12. Insulation & Energy Conservation Inspections

#### □ Required Inspections:

- underfloors, walls and batt ceiling insulation are usually inspected at one time
- blown-in insulation may be inspected at final
- □ Verify **R-Values** of insulation match **CF-1R** and **MF-1R** forms
- □ Prescriptive (Package D):
  - R-30 attic
  - R-19 under-floor
  - R-13 walls
  - or per plan
- □ **U factor** is conductance of energy flow, U=1/R
- □ **R value** measures thermal resistance, R=1/U
  - styrofoam: R value of R-5/in
  - **urethane**: R value of R-7.2/in
- Verify insulation secured unless held in place by finishes
  - at knee walls, under stairs, & under tubs
- □ Faced batts (719.2): flame spread index 25 maximum and smoke developed index 450 maximum or
  - covered directly by wall, ceiling or floor finish
- □ Faced batts shall be installed finished side toward conditioned area
- □ Blown-in insulation **not** allowed at greater than 4:12 slope ceiling (**Energy Code**)
- □ Verify block -outs installed at B & BW vents
  - 1" minimum air space between B & BW vents and insulation
- □ Verify **SHGC** & **U-Factor** of windows match **CF-1R** form

#### **Exterior Openings Sealed to Prevent Infiltration**

- □ Verify exterior openings sealed at doors, windows & exterior penetrations
- Mudsill sealed at floor line at slab floors
- Penetrations in plates are sealed between attic and under-floor
- Exterior sheathing is sealed to prevent openings into wall cavities

#### Airflow at Underfloor and Attic Ventilation

- ☐ Verify block-outs installed for airflow **if attic has blown-in insulation**:
  - between insulation and eave vents
- □ Verify 1" minimum airflow at **cathedral ceilings**:

- between insulation and eave & ridge vents, and
- between insulation and roof ply

#### **Insulation around knob and tube wiring**

□ Insulation around knob and tube wiring **not** allowed **and** shall be removed

#### **Documentation Required on Site**

- □ CF-1R & MF-1R
- □ CF-6R Installation Certificate:
  - CF-6R-ENV-01 and CF-6R-LTG-01 required and may be requested by the inspector at rough inspection
  - **CF—6R-MECH-05 required** in new construction or addition over 1000 sq ft
  - Other CF-6R-MECH required when the related special features are specified on the CF-1R form
  - CF-6R-ENV-HERS required when installations are required to be field verified by HERS rater as specified on CF-1R. Check that the form is a registered copy from a HERS provider data registry.
  - **CF-4R required** when HERS field verification and diagnostic testing is specified on CF-1R. Check that the form is a registered copy from a HERS provider data registry.
  - completed by the installer **and** made available for review to the field inspector

# 13. Second Side/Interior Shear

- □ Verify "second side" interior shear and braced wall sheathing per plan
  - Go to conventional frame wall bracing or shear inspection sections for specific requirements

# 14. <u>Rated Walls (406.1.4, Table 602, 704.2, 704.8, 708, 712- 717, ASTM C 840-04a)</u>

- Drywall inspections **not** required **except** at rated walls and draft stops
- Locations requiring inspection include:
  - between house & garage (406.1.4): walls and ceilings or attic spaces
    - ½" walls and between attics, and %" Type X ceilings below habitable space
  - enclosed usable space under stairs (1009.5.3):
    - interior stairs: ½" sheetrock required
    - exterior stairs: 1 hr fire-resistance-rated construction required
  - duplexes:
    - dwelling unit fire partitions (708)
    - floor-ceiling draft stops between dwelling units (717.3.2)
    - attic draftstops between dwelling units and \%" Type X ceiling
    - dwelling unit acoustic separation (1207): STC 50 minimum
  - fire separation distance less than 5': exterior walls, balconies, decks, stairs, eaves, & soffits
  - **draft stops at attics and concealed roof spaces (717.4.3)**: at 3000 sq ft maximum **unless** sprinklered building
  - walls rated for type of construction (Type V-A, formerly known as Type V-1 hr)
- □ Rated wall inspections verify
  - **drywall** thickness, orientation, offsets, & type
  - fasteners:
    - screws: 1½" at 12" oc (½"minimum penetration into framing)
    - **nails**: 6d (1½") at 7" oc (7/8" minimum penetration into framing)
    - or per plan or listed assembly specifications
    - fastener lengths increased to maintain minimum penetration into framing for installation over other sheathing
  - **opening protection** at doors & windows
  - **penetration protection** installed per listing:
    - manufacturer's installation instructions provided at the time of inspection

#### **Preview of upcoming inspections**

- Clarify corrections & discrepancies still pending from previous corrections
- Clarify scope of work being deferred, if any
- Sub trades finals approved prior to final building inspection approval

- □ Verify insulation, interior braced wall & shear inspections; shower & tub inspections; rated wall & fire protection inspections; & gas tests or meter releases completed as required prior to final inspections
- □ Grading, landings & railings, energy, tempered glass, & emergency egress completed

### 15. FINAL INSPECTION

- Verify all required inspections are approved & documentation collected
- □ Verify elevations match planning approved set of plans
- □ Verify fire partitions, fire barriers, & fire separation distance walls & protected openings completed
- □ **Verify smoke alarms are installed** Verify building address installed

#### **Garage Fire Protection (406.1.3 & 4, 406.2)**

- Attic access covers and pull-down ladders at garage
  - self-closing hatch constructed of ½" drywall over ½" plywood using springs, hinges or gravity,
     or
  - 20 minute (minimum) fire-rated ladder, installed per manufacturer's instructions; or
  - easily & tightly self closing, self-latching standard ladder with ½" drywall overlapping the opening at least ½" minimum when closed

# <u>Landings, Stairways, Handrails, Guards & Ramps (1003.5,1008.1.4; 1008.1.5; 1008.1.6; 1009, 1012; 1013 & 1010)</u>

- □ Replacement of previously code compliant stairs may be like-for-like for rise and run when the existing space will **not** allow a reduction of pitch or slope (3403.4)
- □ **Go to frame section** for specific requirements for landings,thresholds, stairways, handrails, guards & ramps
- □ Locks & Latches: 34" minimum; 48" maximum; double cylinder type **not** allowed (**1008.1.8**)
- Security grilles shall be quick release type

#### Safety glazing and emergency egress

□ Verify required safety glazing & emergency egress provisions (Go to frame section)

#### Fireplace (2111)

- □ Manufacturer's installation instructions available at the time of inspection
- ☐ Hearth, mantle, and glass doors installed (Energy Code & installation instructions)
- □ Spark arrestor required all new & rebuilt solid fuel burning chimneys

#### **Verify Grading is Complete**

- □ Check soils report for grading & drainage requirements
- Grade slopes 5% away from structure for a minimum of 10', toward street or drainage easement (1803.3), or approved alternate
- ☐ **Minimum clearances**: 8" earth to wood sheathing **and** framing **unless** preservative-treated, 6" earth to wood siding, 4" earth to stucco, and 2" clearance above paved walkways

□ Rain water leaders discharge as per plan and soils report; directed away from buildings

#### **Verify Energy Conservation**

- All exterior doors and windows weatherstripped
- □ Verify insulation completed
- □ High efficacy lighting, manual-on occupancy sensors, and/or dimmer switches (**Go to electrical section** for specific requirements)
- □ Accessibility provisions apply to commercial uses in private residences(1101B.6):
  - including entry, exterior & interior path of travel, & sanitary facilities

#### **Documentation collected or verified as applicable**

- Collect special inspection report, compaction report, soils report & structural observation report, as applicable, unless previously collected
  - special inspection report required for non-conventional seismic resistance systems; pier & grade beam foundations unless details per MMC...(not required in Milpitas??), & welding (1704 & 1707.1 seismic)
- □ Verify all **deferred submittal** are approved and constructed per approved plans
- Verify sub-trades finaled
  - verify PG&E meter releases issued as needed at sub-trade finals
- □ Verify fire, public works, and planning clearances approved **or not** required
  - in flood zones: verify flood elevation certificate clearance approved by public works inspector
- Sign permit card
- □ File inspection record for imaging

# **16. SWIMMING POOLS (3109.4.4)**

#### **Building Inspections Typically Required**

- □ Pre-gunite, pre-deck, pre-plaster and final
- □ Underground, rough, potting, and gas test & capacity upgrade inspections: Go to plumbing section and electrical section

#### **Pre-Gunite Inspection**

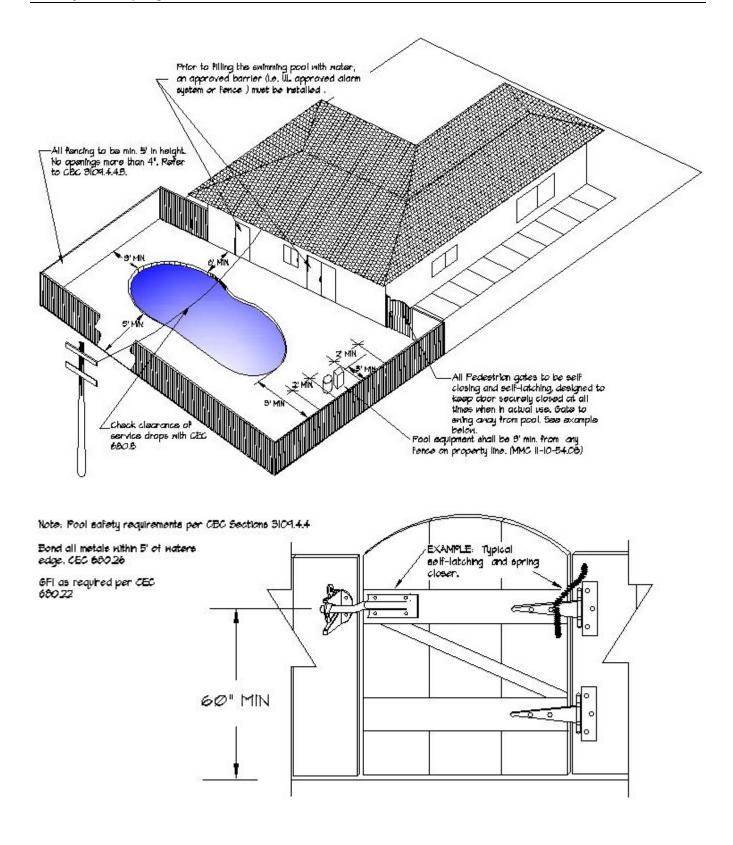
- □ Pool placement: **not** allowed in easements
- Designed as retaining wall **if** within the angle of repose of foundation
- Setback inspections for pool and accessory structures
  - **rebar inspection (pre-gunite)**: verify bond beam, steel schedule; if located on hillside, check for special requirements, including drainage, retaining walls or raised sections
  - safety glazing required within 5' of water and less than 5' above walking surface
- □ Pre-gunite plumbing, mechanical and electrical inspections: Go to plumbing section and electrical section

#### **Pre-Deck Inspection**

□ Primarily an electrical inspection for bonding; may also include rebar inspection at retaining walls (Go to foundation inspection and electrical section)

#### **Pre-Plaster and Final Inspection**

- □ Verify fencing; overhead wire clearance; safety glazing; anti-entrapment device
- □ Pool cover required unless unheated (2008 Energy Code)
- □ Enclosure requirements: (See Fig. 16-1)
  - manual or power safety pool cover meeting ASTM F 1346-91 (2003) instead of enclosure, or
    - **fence**: 3' from pool minimum; height 5' minimum; extends within 2" of grade; prevents passage of 4" sphere; does **not** provide handholds usable to child under 5 years old
  - gates: open away from pool, self-closing, self-latching
  - **latch height**: 5' minimum
  - doors from house and attached garage into enclosure: self-closing and latching at 54" minimum height or equipped with battery or powered exit alarms that provide an audible, continuous alarm when doors are opened or left unlatched (UL 2017 or ASTM F2208-08)
- □ Pool circulation verified at **pre-plaster or potting inspection** 
  - listed and labeled anti-suction device required: (ANSI/ASME A112.19.8-2007)
  - dual drain separation required:
    - (2) suction outlets minimum
    - separated by 3' minimum
- □ Verify electrical, plumbing and mechanical final approved (**Go to plumbing section and electrical section**)



# 17. Demolition Permits (3303)

#### **□** Building Demolition

- utilities discontinued, capped off, safe'd-off (3303.6)
- "non-build" areas match plan
- buildable areas require special inspection & final letter of compaction approval

#### □ Pool Demolition

- plumbing, mechanical, & electrical abated
- "non-build" areas match plan
- buildable areas require special inspection & final letter of compaction approval

## 18. References

ACI 318-05: Building Code Requirements for Structural Concrete

**ACI 530-05: Building Code Requirements for Masonry Structures** 

**ANSI/AITC A190.1-02 Structural Glued Laminated Timber** 

**ASCE 5-03: Building Code Requirements for Masonry Structures** 

ASCE 7-05: Minimum Design Loads for Buildings and Other Structures

2007 California Building Code (CBC) (Title 24, Part 2, Vol. 1 & 2)

2006 International Residential Code for One & Two-Family Dwellings: Code and Commentary,

Vol. I

NDS: National Design Specification for Wood Construction

NFPA 13D-02: Installation of Sprinkler Systems in One and Two Family Dwellings